In this Issue: The Attempts to RESTORE THE COLORADO RIVER TO ITS FORMER CHANNEL.—FIRE-PROOF FERRY-BOATS and EXCURSION STEAMERS.—New Standards in TECHNICAL LITERATURE.

GENERAL LIBRARY, UNIV. OF MICH. DEC 29 1906

ENGINEERING NEWS

5525

A Journal of Civil, Mechanical, Mining and Electrical Engineering.

Volume LVI. No. 26. | 220 Broadway, NEW YORK, THURSDAY, DECEMBER 27, 1906. | $5.00 per Year. Single Copies, 13 Cents.

HYDREX

THE WATERPROOFING FELT

The Highest Grade, Toughest and Most Elastic Waterproofing Felt Made

THE MEMBRANE METHOD

HYDREX FELT & ENGINEERING CO.
Specialists and Experts in Waterproofing Problems
120 Liberty Street, New York
Chicago Washington East Walpole, Mass.

"BESSEMER PAINT"
made exclusively by
RINALD BROS
1142-1146 N. Hancock St., Philadelphia

ALMA
PORTLAND CEMENT
STANDARD BRAND OF MIDDLE WEST
Specially Adapted to All Reinforced Concrete and High-Class Work
ALMA CEMENT COMPANY
Wellston, Ohio

LATROBE FLANGES
Soft Steel Weldless Flanges
Forged and Rolled from
SOLID STEEL INGOTS
Suitable for High-Pressure Steam, Water or Gas Lines
For Details as to Prices, etc., address
RAILWAY STEEL-SPRING COMPANY
71 Broadway, New York

Will Furnish and Erect in United States and Foreign Countries
Wooden Stave Pipe
EXCELSIOR WOODEN PIPE COMPANY,
Monadnock Building, San Francisco, Cal.
Advertisement is on page 14.

PIPE DIP
Brick Filler—Roofing—Paints
AMERICAN ASPHALTUM AND RUBBER CO.
Woman's Temple, Chicago

"What Every Water Works Has Been Looking For"
"A perfect Sleeve to be used for Cracked Pipe. The Sleeve having planed faces with Sheet Lead Gasket, assures a perfect water-tight joint." Send for Circular.
WATER WORKS EQUIPMENT CO., 180 Broadway, New York

Sewer Pipe, Flue Linings, and All Products of Clay
THE EAST OHIO SEWER PIPE COMPANY
IRONDALE, OHIO

SEWER AND CULVERT PIPE
36, 30, 27, 24-in. and All Smaller Sizes
EVENS & HOWARD FIRE BRICK CO.
ST. LOUIS

VITRIFIED PIPE EXCLUSIVELY
Large Sizes
27, 28, 30, 33 and 36-inch
A Specialty
BLACKMER & POST PIPE CO.
St. Louis, Mo.

Vitrified Pipe—Double Strength Extra Heavy Culvert Pipe
All Sizes
MANUFACTURED FROM SHALE
W. S. DICKEY CLAY MFG. CO.
Kansas City, Mo.

MACOMB SEWER PIPE CO. MACOMB, ILL.
Superior Vitrified Sewer Pipe Double Strength Extra Thick Culvert Pipe

ALL SIZES **MONMOUTH SEWER PIPE** MADE
MONMOUTH MINING & MFG. CO., Monmouth, Ill. BY

Write to New York Office for Free Copy SIXTH EDITION
THE REVIEW OF TECHNICAL PAINTS FOR METAL
Established 1876
NATIONAL PAINT WORKS OF WILLIAMSPORT, PA.
100 William Street, New York
Great Northern Building, Chicago

59
It pays to buy high grade motors such as we build.
Crocker-Wheeler Co., Ampere, N. J.

ESTABLISHED 1866
R. S. BLOME CO.
PIONEERS IN
Concrete Construction
Foundations, Floors, Roofs, Sidewalks, etc.
Unity Building L. D. 'Phone, Central 12
CHICAGO

"WELLS LIGHT"
See our advertisement on page 4.

"Lehigh" Portland CEMENT
High Tensile Strength Finely Ground
Light and Uniform in Color
Recommended for High-Class Engineering Work
Manufactured by
LEHIGH PORTLAND CEMENT CO.
Allentown, Pa.
THE KELLEY ISLAND LIME AND TRANSPORT CO.
WESTERN AND SOUTHERN DISTRIBUTORS
CLEVELAND, OHIO

CARBOCOTE
Paint-Varnish
For outdoor or indoor work on structural iron, it is absolute protection against corrosion, weather action or acid fumes.
Valuable also as a waterproofing coating for brick walls, for smoke stacks, and all kinds of roofs.
The prices are exceptionally low.
Send for booklet and sample.
BUCHANAN-FOSTER COMPANY
456 Chestnut Street, Philadelphia, Pa.

THE **PULSOMETER** STEAM PUMP
See advertisement on page 8.

"AMERICAN" TRANSMISSION ROPE "AMERICAN" HOISTING ROPE
THE AMERICAN MFG. COMPANY
65 Wall Street, New York
Manila-Sisal-Jute Cordage New England Branch, 707 P. O. Sq. Bldg., Boston, Mass.
"The Blue Book of Rope Transmission," Sent Free upon request

APADAC
The Perfect Structural Paint
CHILTON PAINT COMPANY, New York

LOOMIS FILTERS
Improved System Established 1880 Results Guaranteed
LOOMIS-MANNING FILTER CO.
Main Office, 828 Land Title Bldg., Philadelphia, Pa.
Branch Offices and Salesrooms
New York Boston Baltimore Washington

Chemistry of Manufacturing
Remedying Defects in Processes; Improving and Inventing Processes; Improving Quality and Yield of Products; Testing and Reporting on New Processes; Utilizing Wastes and Unapplied Substances; Reducing Manufacturing Costs; Experimental Tests and Investigations.
DR. PETER T. AUSTEN, P.C.S.
Consulting Chemist and Expert,
'Phone, 823 John. 82 Pine Street, New York.

CHICAGO PORTLAND CEMENT CO.
MANUFACTURERS OF
"Chicago AA" PORTLAND CEMENT
6,380 bbls. used in Thebes Bridge 6,550 bbls. used in Kankakee Reinforced Concrete Bridge
1,050 bbls. used in Kenosha Reinforced Concrete Bridge
Hennepin Canal, Government Post Offices, Principal Railroads, Dealers, Concrete Block Manufacturers and Contractors in the Northwest, our patrons
We make one brand only The best that can be made
108 LA SALLE STREET, CHICAGO

COVER YOUR STEAM PIPES AND MAKE TIGHT STEAM JOINTS BY USING PATENTED
MINERAL WOOL (Cheap and easily applied) **PIPE COVERING** AND CORRUGATED (For flanged pipes, cylinders, sheets, etc.) **COPPER GASKETS**
Samples and Circulars free UNITED STATES MINERAL WOOL CO., 143 LIBERTY STREET, NEW YORK CITY

Classified Index of Advertisers Appeared Dec. 6th Issue. Alphabetical Index of Advertisers page 39.

STEEL PILING

Evidence of Universal Superiority and Recognition

U. S. Naval Station, Guantanamo Bay, Cuba
Hashirimidozu Water Works, Japanese Navy Dept.
Mersey Dock Estate, Liverpool England
Municipality of Singapore, Singapore. S.S.
Dock for Toronto, Ont., Dominion Gov't of Canada
Dock for Hamilton, Ont., Dominion Gov't of Canada
Buenos Aires & Pacific Ry. Co., Argentine, S. A.
Cordoba Central Ry., Argentine, S. A.
Cananea, Yaqui River & Pacific Ry. Co., Sonora, Mex.

No warped or bent piles. Does not require the use of wood or any other caulking material. Thoroughly Steel Piling, and not a combination of wood and steel.

Represented by THE BRITISH STEEL PILING CO., London, E. C., England

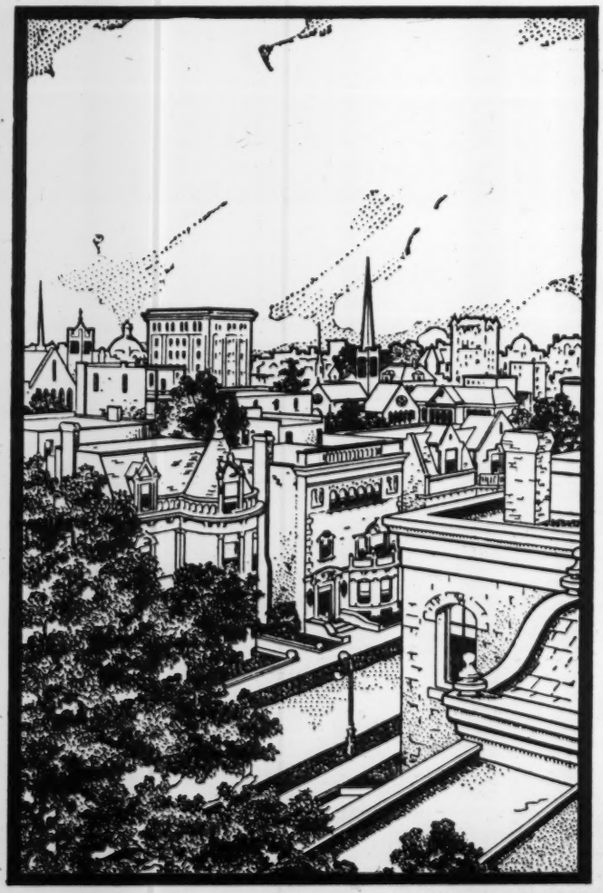
FRIESTEDT INTERLOCKING CHANNEL BAR CO.

"PIONEERS OF THE INDUSTRY"

1526-1528 Tribune Building, CHICAGO, ILL.

Descriptive Catalogue and Model Sent upon Request

SEND FOR THIS BOOK



which shows fully how we fireproofed a laboratory building for the National Board of Underwriters.

This building is considered a model of fireproofing, and the details of its construction will be of great interest to every engineer interested in fireproof construction.

Address our Chicago Office.

NATIONAL FIRE PROOFING CO.

CONTRACTORS FOR

Construction of Fire Proof Buildings

MANUFACTURERS OF

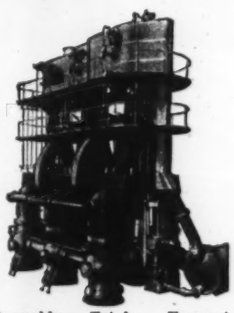
Porous Terra Cotta Hollow Tile Fireproofing Material

New York, Fiatiron Bldg,
Boston, Mass., 840 Old South Bldg.
Philadelphia, Pa., Land Title Bldg.
Pittsburg, Pa., Fulton Bldg.
Chicago, Ills, Hartford Bldg.
Minneapolis, Minn., Lumber Exch
Washington, D.C., Colorado Bldg
London, Eng., 27 Chancery Lane.

ALLIS-CHALMERS CO
MILWAUKEE WIS U S A

PUMPING MACHINERY FOR EVERY SERVICE

High-Duty Vertical Compound and Triple Expansion Pumping Engines.
High-Duty Horizontal Pumping Engines for Water Works and Mills.
Centrifugal Pumps—Single and Multi-Stage.
Hydraulic Transmission Pumping Machinery.
Screw Pumps, Elevator Pumps, Geared Pumps, Mine Pumps, Feed Pumps, Electrically-Driven Pumps.



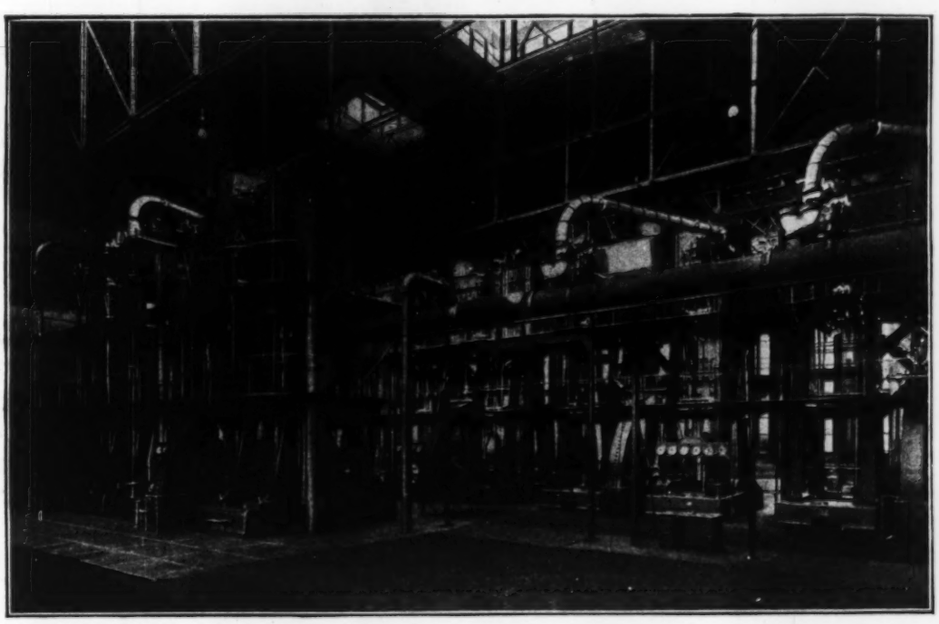
Reynolds Triple Expansion Pumping Engine.

Our Pumping Machinery—Reciprocating and Centrifugal—for Municipal Use Holds the WORLD'S RECORDS for Economy on Official Trials and Annual Station Maintenance.

Every Unit Built is Especially Designed for the Service Required.

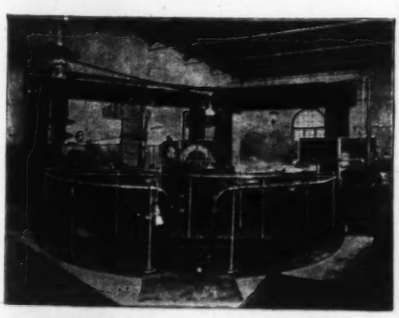
(For records of tests and list of notable installations, see our Bulletins Nos. 1600, 1601 and 1603.)

Our Pumps Are Built For All Capacities and Heads

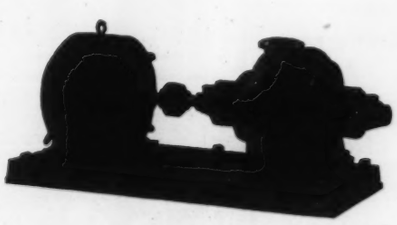


Maximum Efficiency and Durability are Characteristics of our Pumping Machinery

View in Municipal Pumping Station, which contains eight vertical compound Allis-Chalmers Pumping Engines, having an aggregate normal capacity of 114,000,000 gallons daily.

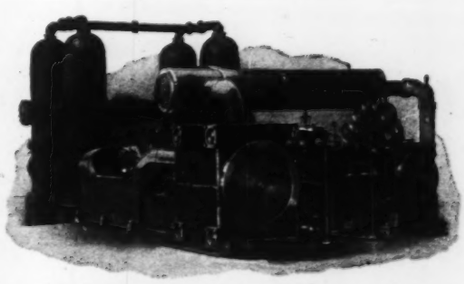


Centrifugal Pumping Engine in Municipal Plant. Machinery of this type built and installed by us has a daily capacity of nearly four billion (4,000,000,000) gallons. Send for our Bulletin 1602.



Two-Stage Centrifugal Pump. Driven by Induction Motor. Complete Unit. Built by Allis-Chalmers Co.

Our Bulletins 1606 and 1608 treat of Single and Multi-Stage Pumps of this type.



High-Duty, Horizontal, Double-Acting Pump. Driven by Cross-Compound Reynolds Corliss Engine. (Bulletins 1605 and 1607.)

Largely used for both Water-Works and Mill Service.

Allis-Chalmers Company has Offices in all Large Cities

Canadian representatives, Allis-Chalmers-Bullock, Ltd., Montreal

RAYMOND CONCRETE PILES

Every pile absolutely monolithic

Our method of placing concrete piles assures perfection in every pile

No failures

No working in the dark

Carefully prepared Book of Facts Free upon application

Raymond Concrete Pile Co.

General Office, 135 Adams St., Chicago

New York Office, 71 Nassau St.

HARPER & WILSON, 501 Mariner & Merchant Bldg., Philadelphia.
COWING ENGINEERING CO., 426 Citizens' Building, Cleveland, Ohio.
CUDWORTH, AXTELL & CO., K. C. Life Bldg., Kansas City, Mo.
E. G. NAVE BROS. CO., Portsmouth, Ohio.
C. H. GLANDORF, Temple Court, Cincinnati, Ohio.
GEO. W. OAKES & CO., Endicott Bldg., St. Paul, Minn.
W. A. TYRRELL, C. E., 620 Chestnut St., St. Louis, Mo.
THE OLIVER CO., Knoxville, Tenn.
THOMAS J. HIND, 19 Milk St., Boston, Mass.

1

Warehouses and Office Building for Crunden-Martin Woodenware Co., St. Louis.
Mauran, Russell & Garden, Architects. 1100 Raymond Concrete Piles used.

CONCRETE STEEL PNEUMATIC CAISSONS

ARE ECONOMICAL, STRONG AND PERMANENT

We design concrete caissons for all foundation purposes under patents granted and pending in Canada, the United States, and Mexico, and inspect their construction anywhere in North America.

We invite correspondence on all subjects pertaining to foundation work.

AMERICAN CONCRETE CAISSON COMPANY

NATIONAL STATE BANK BUILDING, TROY, N. Y.

Simplicity and Strength

IN THE

WELLS LIGHT

800, 2,000, 4,000 C. P.

No mantles or delicate parts to break or get out of order by rough use.

BUILT TO BE USED

AND IS USED IN 25,000 CASES

FULL DESCRIPTION IN OUR NEW CATALOGS

Wells Light Manufacturing Co.

44 and 46 Washington Street, New York

UNITED STATES STEEL SHEET PILING

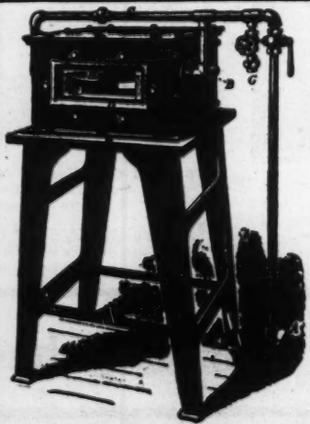
is an ESTABLISHED and INDISPENSABLE FACTOR in modern Construction Methods

Have you received our new catalog?

Is your name on our mailing list?

United States Steel Piling Co.

General Offices, 135 Adams St., Chicago, Ill.



GAS (Blast) FURNACES

and Heating Machines

FOR

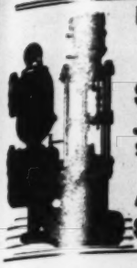
Annealing, Assaying, Enameling, Forging, Hardening, Melting, etc. Also Fuel Gas Plants, Positive Pressure Blowers, and complete outfits for Machine Shops and Factories.

Send for Illustrated Catalogue, Sixth Edition

American Gas Furnace Co.

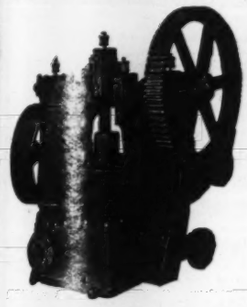
23 JOHN STREET, NEW YORK

LONDON: CHAS. CHURCHILL & CO., Ltd. 9 to 15 Leonard St., E. C.
BERLIN: SCHUCHARDT & SCHUTTE 59 Spandauer St., C.
PARIS: HERMANN-GLAENZER & CO. No. 1 Avenue de la République



DEAN BROS. STEAM PUMP WORKS
INDIANAPOLIS, IND.

SIMPLE AND DUPLEX PUMPS
JET AND SURFACE CONDENSERS
ATLANTIC TYPE BOILER FEEDERS
STEAM POWER AND ELECTRIC PUMPS



THE MANY ADVANTAGES OF
GOULDS TRIPLEX POWER PUMPS

For General Water Supply has resulted in their Almost General Use in Manufacturing Plants, Factories, Mills Breweries, Bleacheries, etc.
For All Kinds of Pumping Work.
Let us send you a Catalog
THE GOULDS MFG. CO.
SENECA FALLS, N. Y.
New York Boston Pittsburg St. Louis

Maximum Saving
from Insulation of Pipes and Boilers

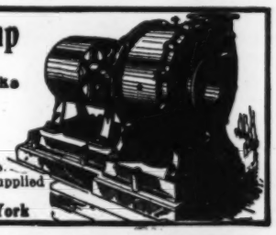
	Percentage of saving	Net Saving per 1000 square feet per day
2-inch thick "Asbestos-Sponge Felted" Pipe Covering, double layer	96%	$1.21
Ordinary Covering 1-inch thick	80%	1.05
	16%	$0.16

EXTRA THICK "ASBESTOS-SPONGE FELTED" PIPE COVERING
Saves $58.00 per Year per 1000 Square Feet of Surface

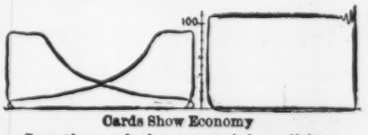
Pays the difference in cost over ordinary coverings in two years and earns $364.00 on the investment in ten years.
Can you afford to overlook this big factor in steam plant economy?
Write Nearest Branch for Full Particulars

H. W. JOHNS-MANVILLE COMPANY
Manufacturers of Asbestos and Magnesia Products, Asbestos Roofings, Packings, Electrical Insulating Materials, "Noark" Fuse Devices, Electric Railway Supplies, Etc.
New York Boston Minneapolis Los Angeles
Milwaukee Philadelphia Pittsburg New Orleans Dallas Seattle
Chicago St. Louis Cleveland Kansas City San Francisco London 411

Special Cataract Centrifugal Pump
Especially adapted for
Dredging, Wrecking, Mining, Water-Works and Sewage Pumping
Patentees and Manufacturers of
Hydraulic Dredging Machinery
Anti-Friction Centrifugal Pump
for all purposes. Capacity 100 to 60,000 gallons per minute. Improved Machinery for Operating Draw Bridges. Water supplied by an improved method of Tube or Pipe Wells.
JOSEPH EDWARDS & CO., 414 Water Street, New York



THE
BETHLEHEM POWER PUMP
All parts readily accessible. Valve and Cylinder Covers easily removed. No Space for Air to collect in Water Passages.



Cards Show Economy
Questions relating to special conditions or service will receive careful attention.
Mention Lift Length of Intake and Working Pressure when writing.
Address
BETHLEHEM FOUNDRY & MACHINE CO.
SOUTH BETHLEHEM, PA.

Engineering News Reprints
A Series of Reprints of Articles of Specially Permanent Value in Technical Work

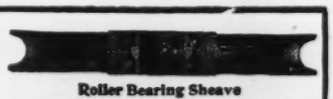
Uniform size: 4½ x 7 inches; Flexible Paper Covers
PRICE, 25 CENTS EACH

No. 1. Ignitions and Explosions in the Discharge Pipes and Receivers of Air Compressors, by Alex. M. Gow, M. E.
No. 2. The Structural Design of Towers for Electric Power Transmission Lines, by Joseph Mayer.
No. 3. The Design of High Abutments, by W. M. Torrance.
No. 4. The reparation of Drawings and Other Illustrations for Photo-Reproduction, by Chas. W. Reinhardt, Chief Draftsman, Engineering News.
No. 5. The Design of Yards for Classifying Freight Cars, by W. A. MacCart, Assistant Engineer, P. R. R.

HILL PUMPS
Modern design. Special features of merit. For all conditions of service and all kinds of power.
IDEAL ELECTRIC OUTFITS
Direct connected or for belt.
Send for catalog.
The Hill Machine Co.
6th and Jackson Streets,
Anderson, Ind.

Deep Well Power Head

Standard Roller-Bearing Co.
48th St. and Girard Ave., Philadelphia
Ball Thrust Bearings
Roller Thrust Bearings
Journal Roller Bearings



Roller Bearing Sheave
Catalogue No. 11 just issued, devoted exclusively to Automobile Bearings

Single and Double Grooved Ball Bearings

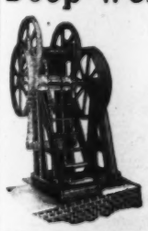
Ball Bearings
Steel and Brass Balls

Ball Thrust for Drills

WATER MOTORS THE BACKUS MOTOR is the CHEAPEST power known for driving light machinery. Water Companies advise the Backus. It stands without an equal. Also GAS AND GASOLINE ENGINES. Agents wanted. Send for Special Circular to
BACKUS WATER MOTOR COMPANY, Newark, N. J.
Chicago Representative, CHICAGO WATER MOTOR AND FAN CO., 22 So. Canal St., Chicago, Ill.

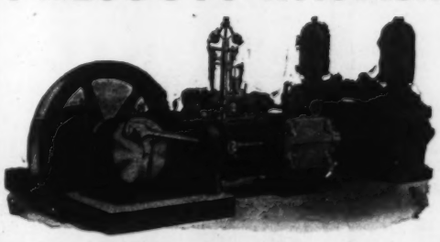
WE POINT THE WAY WHEN TECHNICAL HELP IS WANTED
SEE OUR "SITUATION WANTED" COLUMNS

Deep-Well Pumps



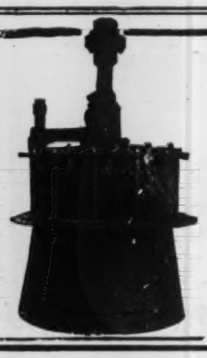
Steam and Power
Double and Single Acting
PUMPS
Of Large Capacity
For Water-Works Mines and Factories
Gas Engines
DOWNIE PUMP CO. DOWNIEVILLE, PA.

PRESCOTT WATERWORKS PUMPING ENGINES



A DISTINCT TYPE OF PUMP OF RECENT DESIGN GIVING SIMPLICITY, CAPACITY AND ECONOMY
Admirably suited to Waterworks service where the pressures do not exceed 150 pounds or 350 feet head.
We build all Types of Waterworks Pumping Engines
Fred. M. Prescott Steam Pump Co.
MILWAUKEE, WIS. 7

SIMPLEX CONCRETE PILES
Concrete Expanded Into the Earth Allowed to Set and Cement thereto
Greatest Possible Bearing Value Obtained
Used by the U. S. Government and by the Most Prominent Engineers, Architects and Contractors
THE SIMPLEX CONCRETE PILING CO., 3400 Disston St., Tacony, Philadelphia
CRAWFORD PAVING CO., 2620 E St., N. W., Washington, D. C.
CRAWFORD PAVING CO., 801 House Bldg., Pittsburgh, Pa.
THE FOUNDATION CO., 25 Nassau Street, New York.
THE FOUNDATION CO., 823 New Nelson Bldg., Kansas City, Mo.
SIMPLEX FOUNDATION CO., 1012 North American Bldg., Philadelphia, Pa.
SIMPLEX FOUNDATION CO., Thomas MacKellar, Agt., 510 Tremont Bldg., Boston, Mass.
LINDGREN-HOCKS CO., 629 Market Street, San Francisco, Cal.
COMMONWEALTH CONSTRUCTION CO., Boston Bldg., Denver, Colo.
NATIONAL CONCRETE CONSTRUCTION CO., 54 Board of Trade Bldg., Louisville, Ky.
WESTERN CONCRETE PILE AND FOUNDATION CO., Tacoma and Portland.
THE MEXICAN CONSTRUCTION AND ENGINEERING CO., Ltd., Mexico City, Mexico.
JOHN H. SUTTER, Stock Exchange Bld ., Chicago, Ill.



SAMSON TURBINE

Almost every one knows that for a given amount of power, the quicker the speed of a turbine, the better. This is due to the fact that LIGHTER and consequently CHEAPER TRANSMISSION MACHINERY can be used. The SAMSON has a QUICKER SPEED than any other turbine of the same dimensions, operating under the same conditions.

JAMES LEFFEL & CO.
302 LACONDA ST., SPRINGFIELD, OHIO, U. S. A.

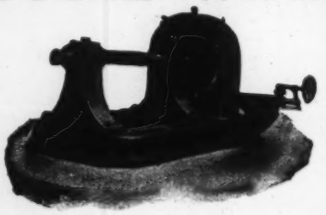
Water Wheel Statistics

The PELTON was the first impulse wheel—invented in 1888. Since then there have been manufactured 12,500 PELTON WHEELS, with a combined capacity of approximately 1,125,000 H.P. Single units ⅛ to 10,500 H.P. Heads from 20 to 2,200 feet. The PELTON CATALOG, a treatise on WATER POWER, will interest the engineer.

The Pelton Water Wheel Co.

19th and Harrison Sts. San Francisco
143 Liberty St. New York

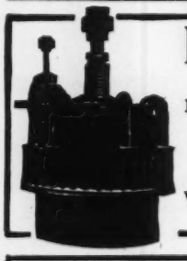
DOBLE WATER WHEELS



have been built for heads from *20 to 2,200 feet* and up to 40,000 *horse-power* capacity.

Write for new Bulletin No. 7

ABNER DOBLE COMPANY
Established 1850
ENGINEERS
SAN FRANCISCO, U. S. A.
Exclusive Licensee in Canada, The John McDougall Caledonian Iron Works Co., Ltd., Montreal



RISDON-ALCOTT TURBINE CO.

MOUNT HOLLY, NEW JERSEY, U. S. A.

RISDON-ALCOTT LEVIATHAN TURBINES

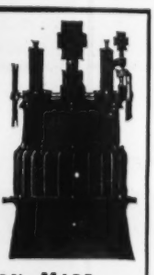
WITH REGISTER CYLINDER FLUTTER GATES

WE BUILD TURBINES TO MEET REQUIREMENTS
CATALOGUE, IF INTERESTED

McCORMICK TURBINES

Suitable for Operating All Kinds of Machinery

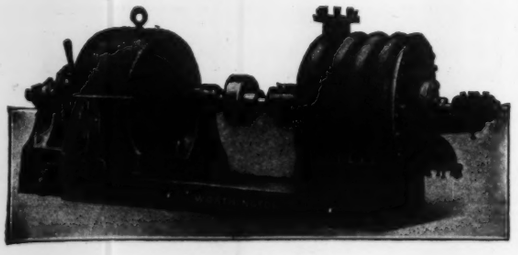
We Design and Build Turbines to Meet Requirements



S. MORGAN SMITH CO.
YORK, PA., U. S. A.
WRITE FOR CATALOGUE IF INTERESTED
BRANCH OFFICE: 176 FEDERAL STREET, BOSTON, MASS.

FOSTER SUPERHEATERS Greatly increase capacity and permanent efficiency of steam turbines
POWER SPECIALTY CO. Trinity Building, 111 Broadway, New York

WORTHINGTON



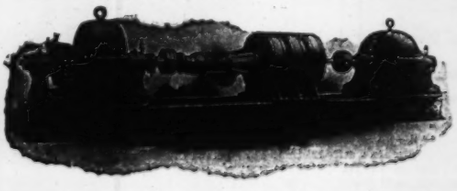
TURBINE PUMPS

are distinguished from other centrifugals by the possession of diffusion vanes, which permit a high lift per stage with good efficiency. These pumps are built in all capacities and for all heads and all services. The efficiency is guaranteed.

Write for literature.

HENRY R. WORTHINGTON

114 Liberty Street, New York City



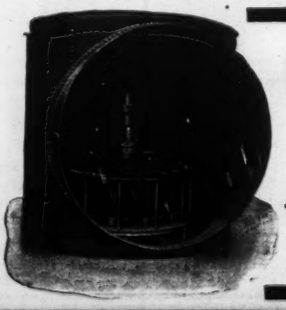
Turbine Pumps

For All Purposes

HIGHEST EFFICIENCY

KINGSFORD FOUNDRY and MACHINE WORKS
OSWEGO, N. Y.
MANUEL LLERA, 26 Cortlandt Street, N. Y.

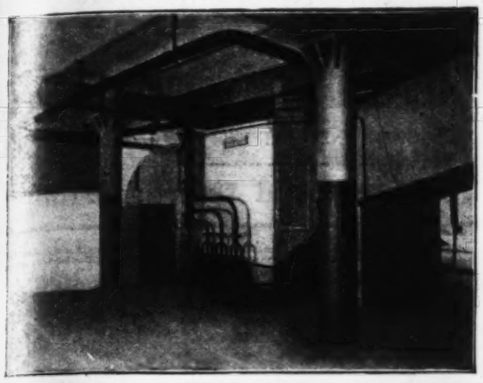
LAWRENCE PUMP & ENGINE CO.
P. O. Box 70, Lawrence, Mass.
Designers and Builders of the
Improved "VORTEX" High Grade
CENTRIFUGAL PUMPS
FOR ANY REQUIREMENTS
Catalog E. A. 1 sent on application
AGENTS { Harold L. Bond Co., 140 Pearl Street, Boston. Chas. F. Chase, 39 Cortlandt Street, New York, and The Bourse, Philadelphia.



WE BUILD THE
New American Turbine
IN VERTICAL OR HORIZONTAL
SINGLE OR DOUBLE UNITS
FOR OPEN OR STEEL FLUMES
TO SUIT ANY CONDITIONS

The Dayton Globe Iron Works Co.
DAYTON, OHIO, U. S. A.
Catalog No. 36 mailed upon application

There's No Scattered Steam Piping in the Sturtevant System



It is all massed in connection with the fan.
There is no danger of freezing, or of damage from leaky joints, valves or air cocks.
The heater is specially adapted to the use of exhaust steam.
Ample and positive ventilation is provided.
The quantity and quality of air are under control.
Operation is independent of wind or weather.
Send for catalogue No. 112.

B. F. STURTEVANT CO.

BOSTON, MASS.
General Office and Works, Hyde Park, Mass.

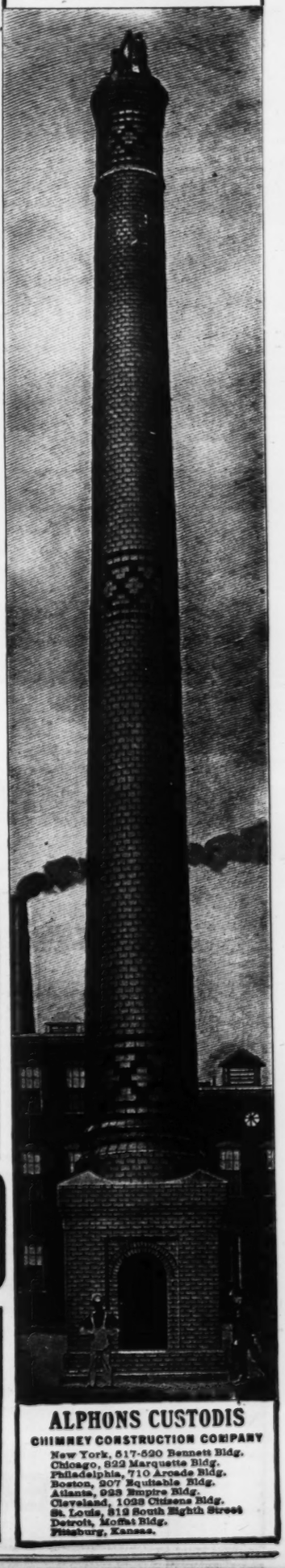
New York Philadelphia Chicago London

Designers and Builders of Heating, Ventilating, Drying and Mechanical Draft Apparatus; Fans, Blowers and Exhausters; Steam Engines, Electric Motors and Generating Sets; Fuel Economizers, Forges, Exhaust Heads, Steam Traps, etc.

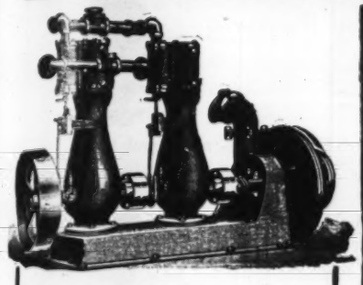
587

PERFORATED RADIAL BRICK CHIMNEYS

OVER 3500 IN USE

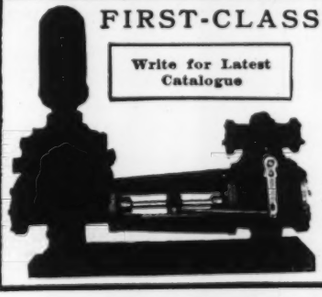


ALPHONS CUSTODIS
CHIMNEY CONSTRUCTION COMPANY
New York, 517-520 Bennett Bldg.
Chicago, 922 Marquette Bldg.
Philadelphia, 710 Arcade Bldg.
Boston, 207 Equitable Bldg.
Atlanta, 923 Empire Bldg.
Cleveland, 1023 Citizens Bldg.
St. Louis, 312 South Eighth Street
Detroit, Moffat Bldg.
Pittsburg, Kansas.



WE BUILD
Centrifugal Pumps
Have been doing so for over *thirty years*. If you want one, write us for *catalogue, prices*, etc.
(We "Hitch 'em up any old way.")
Van Wie Pump Company
SYRACUSE, N. Y.

FIRST-CLASS IN EVERY RESPECT

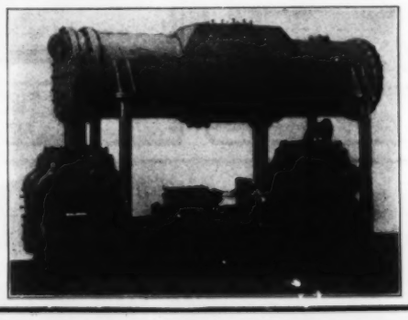


Write for Latest Catalogue

DAVIDSON PUMPS
M. T. DAVIDSON
43-45 Keap St., Brooklyn, N. Y.
141 Broadway, New York
30 Oliver St., Boston, Mass.

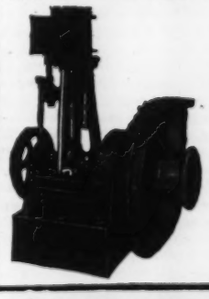
Epping-Carpenter Company, PITTSBURG, PA., U. S. A.

Pumping Machinery for Every Service
Pumps with Perfect Balanced Piston Valves
New York Office 141 Broadway



Simple Compound and Triple Expansion Jet and Surface Condensers
Chicago Office Room 311 40 Dearborn Street

MORRIS MACHINE WORKS
BALDWINSVILLE, N. Y.
Established 1864



CENTRIFUGAL PUMPING MACHINERY
An experience of forty years ought to count for something in the building of a centrifugal pump. Let us know your requirements and we will recommend the best pump for the purpose. Correspondence invited.
New York Office, 39-41 Cortlandt Street
HENION & HUBBELL, Agents, 61-69 North Jefferson Street Chicago, Ill.

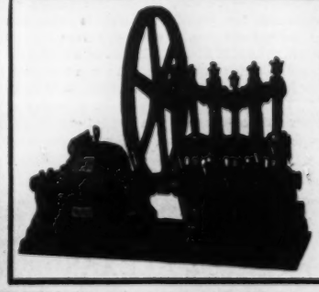
POOLE ENGINEERING & MACHINE CO
ENGINEERS, FOUNDERS AND MACHINISTS
BALTIMORE, MD.
MANUFACTURERS AND DESIGNERS OF ALL KINDS OF
HEAVY MACHINERY
REQUIRING FIRST CLASS WORKMANSHIP AND MATERIALS
BAND, ROPE AND FLY WHEELS FRICTION CLUTCHES SHAFTING PULLEYS AND HANGERS
MACHINE MOLDED AND PLANED GEARING
MACHINERY WHITE LEAD FERTILIZER WORKS
GRAIN ELEVATORS FLOURMILLS BRASS COPPER
TIN PLATE ROLLING MILLS CABLE MARINE RAILWAYS
POOLE-LEFFEL TURBINE WATER WHEELS
DREDGING MACHINES
CIRCULARS ON APPLICATION
IRON CASTINGS 20,000 LBS. TENSILE STRENGTH

CENTRAL STATION HEATING

AMERICAN DISTRICT STEAM CO., Lockport, N. Y.
Originators and Builders of HOLLY SYSTEM OF UNDERGROUND STEAM DISTRIBUTION for the utilization of exhaust steam from Electric and Power Plants for heating purposes. 200 plants in operation. Also manufacturers of WOODEN WATER PIPE and Steam Pipe Casing, Steam Traps, Condensation Meters, Valves, Cooling Coils, Steam Separators, and a full line of Steam Fitters' Supplies. Write for our pamphlet and price list.

Please mention ENGINEERING NEWS.

LET US HAVE YOUR SPECIFICATIONS FOR SINGLE DUPLEX & ROTATIVE
STEAM AND POWER
PUMPS
THE JOHN H. McGOWAN CO. CINCINNATI
SIMPLE COMPOUND & COMPOUND CONDENSING
ELEVATOR & WATER WORKS PUMPING ENGINES



Deming Triplex Power Pump
are adapted for nearly all the requirements of engineering service and represent the highest development of economical power pumping.
If you are interested in Power Pumping Machinery write us for Catalogue "O," showing our complete line, or apply to our nearest general agency, as listed below.
THE DEMING COMPANY
SALEM, OHIO
Henion & Hubbell, Chicago
Harris Pump & Supply Co., Pittsburg
W. P. Dallett, Philadelphia
Ralph D. Carter Co., New York City
Boot, Neal & Company, Buffalo
Chas. J. Jager Co., Boston
Sydney Pump & Well Co., Richmond, Va.
Laib Co., Louisville, Ky.

LIGHT AND HEAVY **FORGINGS**

PROMPT DELIVERY

The Columbia Machine Works and Malleable Iron Company

247 Chestnut Street Brooklyn

THE WILLIAM TOD CO.

YOUNGSTOWN, OHIO

BUILDERS OF

Reynolds High Duty Pumping Engines

COMPOUND AND TRIPLE EXPANSION

Special Sewerage and Drainage Pumps

MARINE ENGINE AND MACHINE COMPANY

Office, 136 Liberty St., New York Factory, Harrison, N. J.

BUILDERS OF

GROSHON HIGH-DUTY PUMPING ENGINES

Vertical, Triple Expansion Horizontal

Triple or Compound Crank and Fly-Wheel Duplex

Direct-Acting High-Duty

PUMPS

All rough service, low-lift pumping, such as Draining Excavations, Foundations, Sewer Trenches, Quarry Pits, Mine Shafts, etc., is best done by use of

Pulsometer Steam Pumps

Built for hard work. Has no easily deranged inside or outside mechanism. Requires neither engine belt, oil, packing nor Special Foundation. Operates as well suspended as stationary, and may be raised or lowered as occasion demands without interrupting its work.

GRITTY, MUDDY WATER does not hurt it

Simple to install. Simple to operate.

An Ideal Contractor's Pump

Write nearest Agent for Catalogue

Pulsometer Steam Pump Co., 18 Battery Place New York

Henion & Hubbell, Chicago
J. J. Shannon & Co., Philadelphia
Perrin Seamans & Co., Boston
K. C. Contractors' Supply Co., Kansas City
Smith-Courtney Co., Richmond, Va.
The Caldwell Bros. Co., Seattle
Harron, Rickard & McCone, San Francisco
Miller Supply Co., Huntington, W. Va.
A. R. Williams Mach'y Co., Toronto, Can.
Haubtman & Loeb Co., Ltd., New Orleans

Please mention ENGINEERING NEWS.

The Platt Iron Works Co.

Dayton, Ohio, U.S.A. *Agencies in Principal Cities*

Pumping Machinery *Condensers*

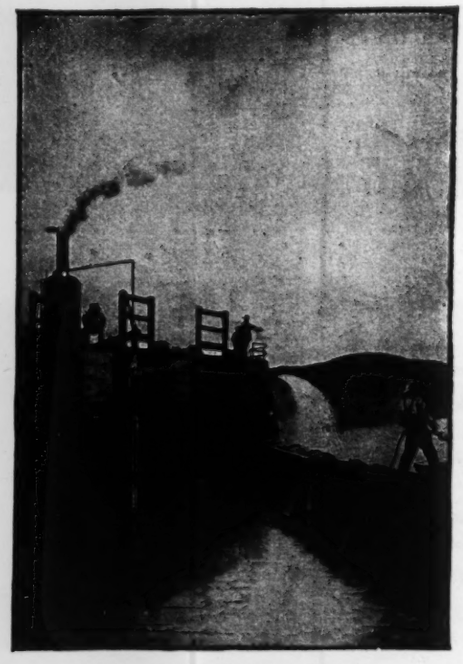
Air Compressors *Oil Mill Machinery*

Feed Water Heaters *Water Wheels*

WE POINT THE WAY WHEN TECHNICAL HELP IS WANTED

SEE OUR "SITUATION WANTED" COLUMNS

THE EMERSON AS A CONTRACTOR'S PUMP



The Emerson Pump Emptying a Cofferdam.

The cut shows the Emerson Pump being used for emptying a cofferdam. For this work its reliability, efficiency and general handiness appeal forcibly to the man of business whose interests demand pumping at the least expense and annoyance regardless of conditions. The steam and discharge pipes and the pump are all self-contained, and the whole suspended by chain falls or by cable and windlass from some convenient overhead beam. The steam pipe being made flexible at the top by elbows in the pipe, so that it will swing when the pump is raised and lowered. The whole can be lowered right down to the sump, where suction is effective, without stopping the pump. Its ability to handle water containing large percentages of sand, gravel, quicksand or mud without injury to itself, and to work perfectly without "running dry" when taking in large quantities of air with the water, enables the pump to drain a sump and keep it drained with scarcely any attention, and is in strong contrast with centrifugal pumps that require engines, foundations, shafting, which must be kept in line; belting, which must be protected from the weather, the inability to get them down close to the work where suction is effective, the constant care and attention they require and the annoyance of their "running dry" and requiring priming every time the water gets low enough to admit the least air in the suction pipe. **The Emerson Pump is not affected by the weather, has no belts to slip or shafting to keep in line, no working or moving parts exposed, and can be covered with mud without damaging it or affecting its working in the least.** It makes no noise nor is there any exhaust steam from it. **It only needs to be suspended in position and connected with the boiler by a small pipe, and it is ready for business,** and is much more reliable for continuous runs than anything that exists. They are being used by many of the largest contractors in this country.

For irrigation, there has never been a pump built, nor probably never will be, that is so thoroughly adapted to this service, where reliability is so essential. **There is nothing made so reliable; nothing so simple, or that will stand rough usage and exposure to all kinds of weather without damage, or that requires so little attention, or as few repairs.** The pump can either be suspended from a tripod or set on a foundation, or if used in a well it is simply suspended in the well by a chain or cable and arranged to raise or lower to suit the level of water in the well, similar to the description of the pump as used for mining. **It has no packing glands or stuffing boxes, no belts, pulleys or shafting, no adjustments to make, and is the ideal pump for continuous runs of long duration. The steam and discharge pipes are smaller, and the weight of the pump very much less than any other of same capacity, which makes them cheap and easy to handle and install. They are more economical and durable generally than any other pump.** No farmer or planter can afford to risk the loss of a crop by using a pump that is in the least uncertain, or that is liable to break down or wear out just when he needs it, nor one that requires frequent repairs. The Emerson is the only one that fully measures up to the requirements.

Our Catalogue C will be a revelation to you if you are interested in pumping. **Ask about our Quick Cleaning Strainers and Foot Valves.** They are great too.

THE EMERSON STEAM PUMP CO.

Office and Works, Prince Street and Strand, ALEXANDRIA, VA.

We Are the First!

Yes, we are the first of the manufacturers of Terne Plates to suggest and adopt the plan of stamping the amount of coating carried by our grands of Roofing Tin, and of stamping all wasters as such.

This is the "square deal" which all Jobbers, Architects, Roofers and Property Owners have needed for so long—and already the move has shown a good effect.

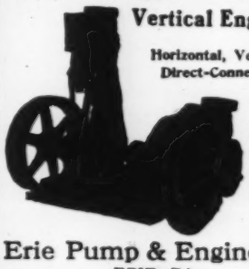
In future, don't merely specify American Ternes, American Extra, American Special, American Old Style A, 2A, 3A, 4A, 5A, MF, or U. S. Eagle New Method—but examine the boxes when they arrive and see that the contents indicate exactly what you purchased. If the sheet isn't stamped with the coating, look along the edge for the mark "Waster."

If you'll use these precautions you'll find Roofing Tin to be the most satisfactory roof covering you can use—but you can't expect an 8-lb. Terne to do the work of the old time or present day 30 to 40-lb. coated plates.

Send for our booklet "From Underfoot to Overhead" if you would know how a high-grade Terne Plate is made, and use MF ROOFING TIN, "The Terne which turns the elements," if you want the best Roofing Tin that can be had.

AMERICAN
SHEET & TIN PLATE
FRICK BUILDING COMPANY PITTSBURGH, PA.

Centrifugal Pumps
Vertical Engines



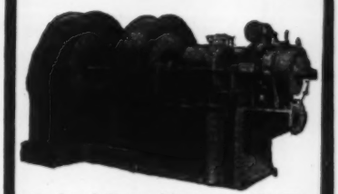
Horizontal, Vertical, Direct-Connected

Write us for Prices

Prompt Delivery

Erie Pump & Engine Co.
ERIE, PA.

DE LAVAL



De Laval-Sirocco Blower Set, 150 HP.

Steam Turbine Motors
Steam Turbine Dynamos
Steam Turbine Blowers
Steam Turbine Centrifugal Pumps
Electro-Motor Centrifugal Pumps

Send for Catalogue No. 21
De Laval Steam Turbine Co.
Works and Sales Offices, Trenton, N. J.

Please mention ENGINEERING NEWS.

Weber
STEEL-CONCRETE
CHIMNEY CO

GENERAL OFFICES:
930-934 Marquette Bldg
CHICAGO
BRANCHES:
NEW YORK, PHILADELPHIA
ST. LOUIS, SAN FRANCISCO
LONDON ENG.

Chimney Built for
Portland General Electric Co.
Portland, Oregon
Height, 230 ft. Inside diameter 12 ft.

NOTICE

Our system of chimney construction is protected by letters patent, and we will vigorously prosecute infringers, whether they be builders or users of our chimney. We hereby notify the public that we are now prosecuting in the United States Courts infringers of our chimney patent No. 748,242.

Weber Steel-Concrete Chimney Company

Scientific Waterproofing

CHAPTER VI.

A waterproof-course demands the same careful consideration that is bestowed upon the reinforced concrete structural course. In fact, the pitchy matter (which constitutes the waterproofing element of a waterproof-course) requires a network of fibres to reinforce it, in essentially the same manner as a network of steel reinforces concrete. The correct reinforcing element for a waterproof-course is a textile fabric,—not a felted one. The reasons are very apparent:—

GREATEST STRENGTH GREATEST ELASTICITY
GREATEST TOUGHNESS

SIASTEX

WATERPROOFING FABRIC

is AN ASPHALTED TEXTILE, and when used with our

CARBORON COLD AMALGAMATING COMPOUNDS

forms the most advanced state of the art of waterproofing.

WE ARE THE WATERPROOFERS OF

The entire New York Rapid Transit Subway.
The Penn. R. R. Terminal and Tunnels in New York and New Jersey.
The N. Y. C. & H. R. R. R. Terminals and Improvements in N. Y.
Representing about 12,000,000 Square Feet Waterproofing.

WE LAY

Sicilian Rock Asphalt Floors and Pavements for Hospitals, Cellars, Kitchens, Breweries, Warehouses, Manufactories, Railroad Platforms, Sidewalks, Slaughter-Houses, Stables, etc.
SICILIAN ROCK ASPHALT PAVEMENTS FOR STREETS.
BERMUDEZ AND TRINIDAD ASPHALT PAVEMENTS FOR STREETS.

FOR PRICES AND PARTICULARS ADDRESS

THE SICILIAN ASPHALT PAVING CO.
41 PARK ROW, NEW YORK

Steel Concrete Chimneys
"Wiederholdt" System

NO WOOD FORMS

NO DELAYS

LINED AND COVERED WITH FIRE CLAY

ECONOMICAL

INDESTRUCTIBLE

Chimney built for the Burnwell Coal Co.
Height 100 ft. Inside Diameter 5 ft. 6 in.

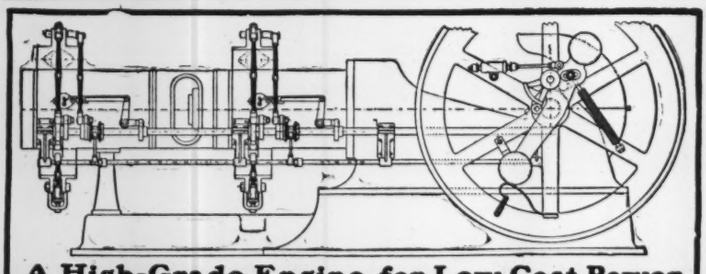
Atlas Construction Company
912-914 Victoria Bldg., St. Louis,
EXCLUSIVE AGENTS
Send for Illustrated Circular

The "ANTI-PLUVIUS" Skylight on Train Shed of the D., L. & W. Terminal Station at Hoboken, N. J.
We are now completing contract for 125,000 square feet of skylighting at this Terminal.

The "Anti-Pluvius" Skylight

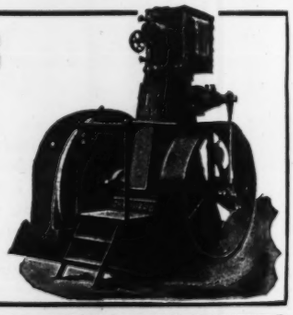
is especially adapted for Railway Terminal Stations, for factories and for offices, where an absolutely water-tight, weather-proof and non-deteriorating skylight is required. 3,000,000 feet of Anti-Pluvius Skylight in use in this country and Europe. We will gladly furnish information or give estimates.

THE G. DROUVE CO., 1135 Broadway, New York City
Factory at Bridgeport, Conn.



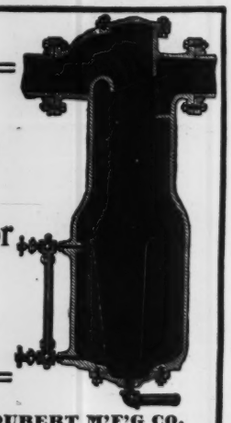
A High-Grade Engine for Low Cost Power
THOMPSON AUTOMATIC CUT-OFF GAS ENGINE
Designed to operate on producer gas
Develops 1 B. H. P. hour per lb. of coal. Regulates within 2 per cent. No licensed engineer required. Offers many advantages over other gas engines and steam engines. Write us.
J. THOMPSON & SONS MFG. CO., Beloit, Wis.

SHEPHERD ENGINES
are built of the best that money can buy, but so are a dozen other makes, so that point interests you only in a general way. Where SHEPHERD ENGINES differ from the other dozen or so, is in the operating cost. There they stand alone.
Let us send you the proof.
SHEPHERD ENGINEERING CO.
FRANKLIN, PA.



ALBERGER CONDENSERS
Wainwright Heaters and Expansion Joints
ALBERGER CONDENSER COMPANY, 95 Liberty St., New York
Branch Office, 205 LaSalle Street, Chicago

THE
Stratton Steam Separator
INSURES DRY STEAM

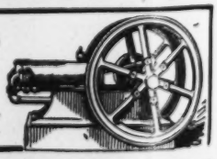


THE GOUBERT M'F'G CO.
83 Liberty Street New York

FLEXIBILITY
is one of the strong points of the Parker Boiler
Parker Boiler Company
1507 Pennsylvania Building
Philadelphia
New York Chicago Pittsburg San Francisco

THE MIETZ & WEISS
OIL ENGINES
Marine, 3½ to 100 H. P. Stationary, 1½ to 80 H. P.
USE KEROSENE AND FUEL OILS
Direct Connected Generators, Pumps, Hoists, Etc, *Send for Catalogue*
A. MIETZ, 128-138 MOTT STREET, NEW YORK

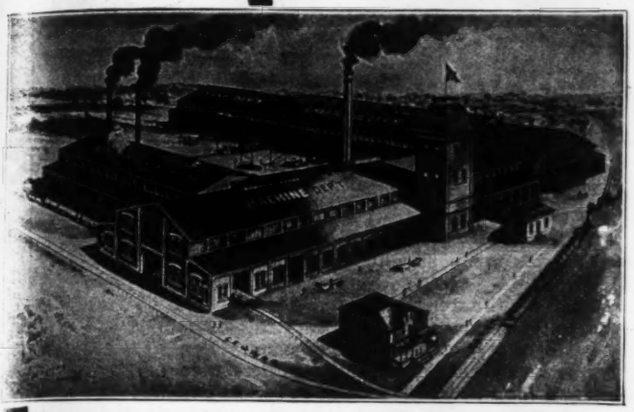
Gas & Gasoline Engines
1 to 50 HP. for all Purposes
Our Specialty: WATER SUPPLY OUTFITS
Valuable Catalogue and Information FREE
The Springfield Gas Engine Company
27 West Washington Street, SPRINGFIELD, OHIO



SOFT WATER
Kennicott Water Softener Company
527 Railway Exchange Building, Chicago

TANKS, STEEL CHIMNEYS
Stand Pipes, Riveted Steel Pipe and General Plate Construction
HAMMOND IRON WORKS, Warren, Pa., U. S. A.
HERMAN NIETER, Sales Agent, 29 Broadway, N. Y. City.
KRUMBHAAR & AIKEN, Sales Agents, 201 Denegre Bldg., New Orleans, La.

NEW ERA GAS ENGINES Catalog Free
1½ to 150 H.P. For Gas or Gasoline
THE NEW ERA GAS ENGINE CO., 37 Dale Avenue DAYTON, OHIO



ENG NEWS.

We Manufacture

Oil and Acid Tanks, Oil Refinery Work, Car Tanks, Rotary Dryer Cylinders, Rotary Cement Cylinders, Blast Furnaces, Annealing Boxes, Standpipes and Water Towers, Converters, Ladles, Boilers, Heaters. Girders, Steel Buildings, Grain Elevators, Copper Furnaces, Clinker Coolers, etc., Self-Supporting Stacks, Galvanizing and Tinning Pots. Lime Kilns, Brick Hardening Cylinders, Penstocks and Riveted Pipe, Creosoting Cylinders, Cyanide Tanks.

THE REEVES BROTHERS CO.
Alliance, Ohio. U.S.A.

Heavy and Light Plate Construction of Every Description Erected Anywhere
PITTSBURG OFFICE, 1129 FRICK BUILDING

Riter-Conley Mfg. Co.
PITTSBURGH, PA.
Steel Construction in All Branches
Standpipes, Penstocks, Oil Tanks
Gas Holders, Chimneys
Girders, Viaducts, Buildings, etc.
Gas Works, Blast Furnaces, Oil Refineries
New York Office, Trinity Building, 111 Broadway

"Always Safe and Reliable. Ask Your Friends."

Round or Square Oval or Oblong

Whatever the shape desired in a stock or storage tank, and whatever the size of material, we are ready to fill orders promptly.

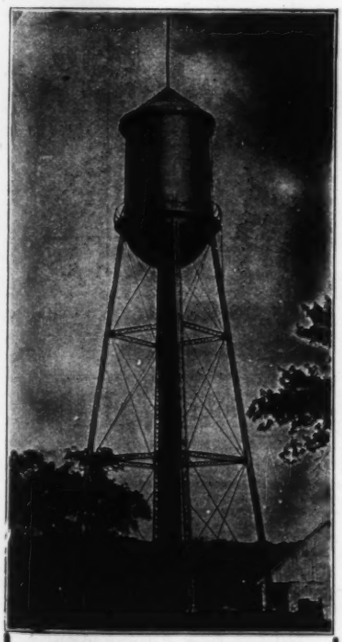
W. E. CALDWELL CO.
LOUISVILLE, KY.
Tanks { Steel, Wood / Galvanized } Towers
Windmills, Pumps, Gas Engines

WOODEN TANKS Established 1840
GEO. J. BURKHARDT'S SONS
Office, 435 Drexel Building
Philadelphia, Pa.

Pennsylvania Engineering Works
232 South Jefferson Street, New Castle, Pa.
BLAST FURNACES

RAILWAY WATER AND COALING STATIONS
STEEL TOWERS, WOOD TANKS
STAND PIPES, CAST IRON PIPE
GAS AND GASOLINE ENGINES
PUMPING OUTFITS
WATER SOFTENING
Write for Special Catalogues
Otto Gas Engine Works
T. W. SNOW, Manager, 1201-355 Dearborn St., Chicago

BOOKS ON ANY SUBJECT in which you are interested will be sent by us, charges prepaid, upon receipt of price. THE ENGINEERING NEWS PUBLISHING CO.



We Design and Build **STAND-PIPES**
Steel Towers with Steel Tanks or Wooden Tanks
COMPLETE WATER WORKS PLANTS
Also Steel Smoke Stacks, Bridges
STRUCTURAL IRON WORK FOR BUILDINGS
DES MOINES Bridge and Iron Works
DES MOINES, IOWA

STEEL STACKS
TANKS
Stand Pipes
Rendering Tanks
Storage Tanks
Grain Tanks
Elevator Hoppers
Ash and Coal Chutes
Condensers
Cooling Tanks
SHEET METAL WORK OF EVERY DESCRIPTION
NEW SHOP
MODERN TOOLS
PROMPT DELIVERY
WRITE TO
National Boiler and Sheet Iron Works
INDIANAPOLIS, IND.

The Hodge Boiler Works
East Boston Mass.

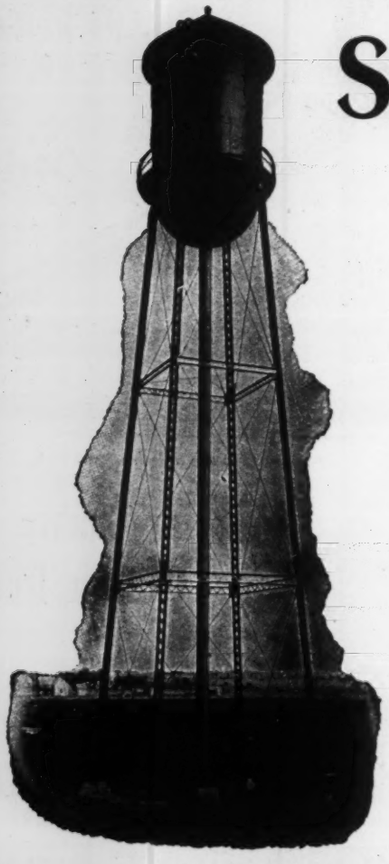
Stand-Pipes Boilers Etc.,Etc.
Boston Office Room 27 Mason Building

WATER TANKS TOWERS STAND PIPES

For domestic service and fire protection everywhere.
May we bid on your work?
TIPPETT & WOOD
Phillipsburg, N. J.

Structural and Steel Plate Work
For Blast Furnaces
Meehan Boiler and Construction Co.
LOWELLVILLE, OHIO

For Testing Iron, Steel Chains, Cloth, Cement, Springs, etc. **RIEHLE U. S. TESTING MACHINES** RIEHLE BROS. TESTING MACHINE CO. 1422 North 8th Street, Philadelphia



Steel Water Towers

All our steel water towers are built with hemispherical bottom tanks.

This is the ideal design from an engineering standpoint, as it is the only form of tank bottom which has no tendency to change its shape when the tank is filled. It is also the most economical design, as it thus does away with the heavy plates and girders used to support all other forms of tank bottoms—the hemispherical bottom requiring no other support than that afforded by the cylindrical shell from which it is suspended.

Our method of forming these hemispheres is the only one which does not injure the metal of which they are built. We do this work entirely without heating or hammering, which produces internal stresses in the plates which cannot be entirely removed by subsequent annealing.

We invite comparison between the appearance of our hemispherical bottom tanks and those of any other design.

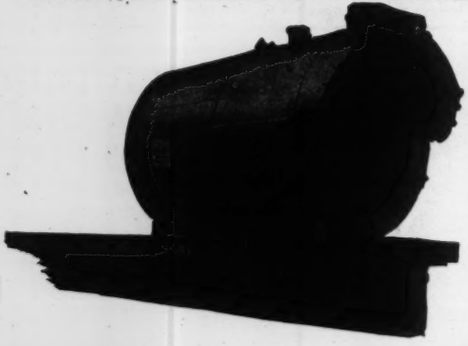
Chicago Bridge and Iron Works

105th and Throop Sts., Chicago, Ill.

In Writing to Advertisers Please Mention ENGINEERING NEWS.

SPRINGFIELD BOILER & MFG CO.

SPRINGFIELD - ILLINOIS



PIONEERS AND SPECIALISTS

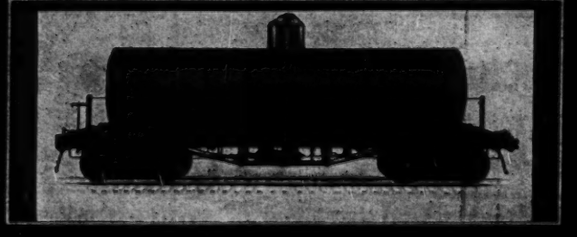
IN MAKING

Internal Furnace Boilers

Have built more of these boilers than any concern in the United States

Get our prices and let us give you evidence of the superiority of our boilers

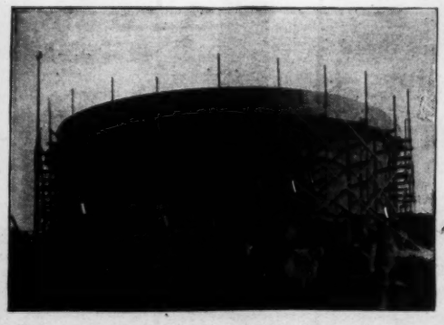
TANKS OF ANY CAPACITY ON STEEL OR WOOD CARS



WARREN CITY BOILER WORKS

WARREN, OHIO

STEEL TANKS AND PLATE WORK



Cut shows one of 24 Tanks recently built by us for the O. R. & N. Co. in Oregon.

IF YOU WANT
PROMPTNESS
ECONOMY
DURABILITY
AND
HONEST WORKMANSHIP
WRITE US

ESTABLISHED 1872

WM. GRAVER TANK WORKS, East Chicago, Ind.

Buffalo Fan System

OF

Heating AND Ventilating

Installation of Buffalo Fan System where Space is at a Premium.

Results in a thorough distribution of air, full utilization of the heat units and a uniform temperature throughout the building. Low initial cost. Maintenance far cheaper than the furnace and steam systems.

For Industrial Works
Public Buildings
Schools, etc.

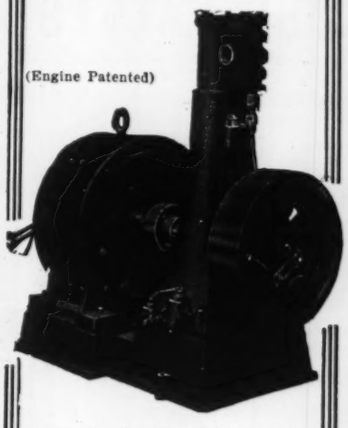
Send for Illustrated Catalogue

BUFFALO FORGE COMPANY, Buffalo, N. Y.

THE CANADIAN BUFFALO FORGE COMPANY, Montreal, Canada

"ABC"
SELF-OILING ENGINES

(Engine Patented)



Are especially adapted for operating Generators, Pumps, etc.—in fact, for any service demanding continuous operation at high speeds.

Let us tell you about them.

AMERICAN BLOWER CO.
DETROIT

NEW YORK CHICAGO ATLANTA LONDON

Special Fans for Special Cases

The fan wheel shown above was supplied for Public School No. 30, of Jersey City, N. J., to exhaust air from the ventilating ducts of the building. The wheel is to be fitted, without any special housing, into the side of the chamber into which it discharges, this chamber being open to the atmosphere. It is the least expensive type of wheel for the work, both in first cost and the amount of power required.

The photograph shows the fan wheel without the front side plate, but with the added nothing else is needed but the shaft, bearings and pulleys to complete the fan. The suction side of the wheel is simply set close up to the circular mouth of the duct from which it draws, while the air discharged from the periphery escapes freely to the atmosphere. Such a fan will create much higher differences of pressure than a disk or propeller fan, and the efficiency is as good or better than that of an ordinary centrifugal blower. The entering current of air is gradually turned to a radial direction without shock or eddies.

Such a wheel may be used for exhausting to the open air or for delivering air into a room under pressure, as into a basement or fireroom.

We are always ready to build special fans for special purposes, and to study the user's requirements with a view to saving money for him.

Write for our New Fan Catalog "EN."

THE GREEN FUEL ECONOMIZER CO.
MATTEAWAN, N. Y.

(Sole builders of the Green Fuel Economizer in this country)

89

THE BABCOCK & WILCOX CO.

85 LIBERTY ST. NEW YORK
CABLE ADDRESS "GLOVEBOX" NEW YORK
ALL FOREIGN OFFICES "BABCOCK"

STEAM

WATER TUBE BOILERS

SEND FOR OUR BOOK "STEAM"

BOSTON 23 FEDERAL ST.
PHILADELPHIA NORTH AMERICAN BLDG.
CHICAGO 1035 MARQUETTE BLDG.
SAN FRANCISCO 53 FIRST ST.
DENVER, COL. 1421 SEVENTEENTH ST.
ATLANTA, GA. 1027 EMPIRE BLDG.
MEXICO CITY 2ND FERROCARRIL DE CINTURA 7 AVENIDA JUAREZ
HAVANA, CUBA 25 CALLE DE LA HABANA

HORIZONTAL RETURN TUBULAR
BOILERS

Highest Grade Material. First Class Workmanship. Philadelphia Law and Insurance Specification Boilers a specialty. No piece work.
Write for Bulletin No. 10N.

A. D. GRANGER CO.
New York Philadelphia Pittsburg
Engines — Boilers — Stacks — Tanks — Heaters

STAND PIPES
PENSTOCKS
STEEL STACKS

BOILERS

Horizontal Tubular, Vertical Tubular and Portable Types

TANKS, STILLS AND CONDENSERS

For Oil Refineries

Send us your Specifications for All Types of Steel Plate Construction

Struthers-Wells Company
WARREN, PA.
New York Office, 26 Cortlandt Street

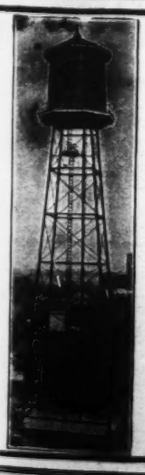
THE
Petroleum Iron Works Company
WASHINGTON, PA.

ALL CLASSES OF
Steel Plate Construction

BRANCH OFFICES
Pittsburgh, Pa.
Beaumont, Texas

Fire Tube, Water Tube and Internal Furnace
BOILERS

SELF SUPPORTING STEEL STACKS
Ask for catalog "EF"
Established 1885
E. KEELER COMPANY
WILLIAMSPORT, PA.
New York Philadelphia Wilkes-Barre
New Orleans Chicago San Francisco



LARGE TANKS

For Railroads, Towns, Corporations or Private Use

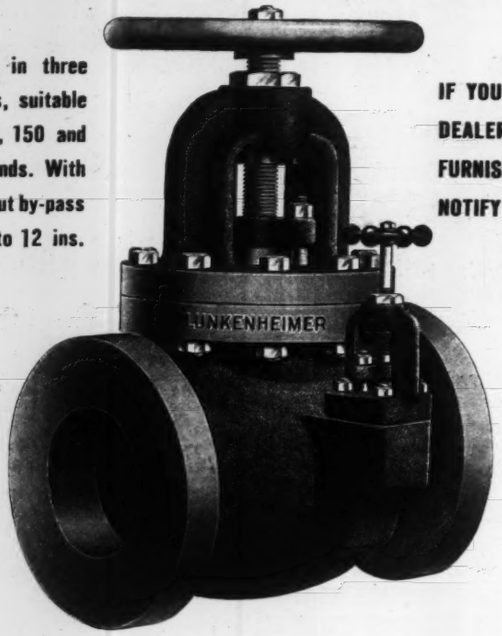
Steel Substructures —for Tanks—

U. S. Wind Engine and Pump Co.
20 WATER STREET, BATAVIA, ILL.

PLAIN LETTERING
BY PROF. HENRY S. JACOBY
Most comprehensive book on this subject. Contains standards of U. S. Engineer Corps, U. S. Geological and Geodetic Surveys, and Mississippi River Commission.
Cloth, 10x7 inches; 83 pages. Price $3.00

LUNKENHEIMER
IRON BODY GLOBE VALVES

Made in three patterns, suitable for 125, 150 and 250 pounds. With or without by-pass from 2 to 12 ins.



IF YOUR LOCAL DEALER CANNOT FURNISH THEM NOTIFY US.

THE LUNKENHEIMER COMPANY

Largest Manufacturers of High-Grade Engineering Specialties in the World

General Offices and Works, CINCINNATI, OHIO, U. S. A.

Branches New York, 66-68 Fulton Street
London, S. E., 35 Great Dover Street

3 E. N.

Union Hydraulic Works

J. THOMPSON & CO.

Fire Hydrants, Stop Valves, Check Foot Relief Station Valves, etc.

Cast Iron Specials for Water Works, Gas Works and Railroads

Flange Pipe and Fittings a Specialty

Send for Estimates

Van Horn and Sophia Sts.
PHILADELPHIA, PA.

They Stand the Test of Time.

For a quarter of a century we have been building CYPRESS TANKS for railroads, factories, tanneries, and for other uses, and never yet put up one that proved unsatisfactory. We are making them better today than ever, and at continued low prices. Catalogue free. Write for it today.

G. M. DAVIS & SON, Palatka, Florida.

ESTABLISHED 1829

I. P. MORRIS COMPANY

INCORPORATED 1901

PHILADELPHIA, PA.

DESIGNERS and BUILDERS of SPECIAL INSTALLATIONS of Pumping, Blowing and Mine Hoisting ENGINES—Vertical and Horizontal TURBINES for High and Low Heads; Centrifugal Pumping Machinery.

HIGH-CLASS BOILERS—FIRE TUBE TYPES

For Stationary and Marine Purposes. TANKS. Special Heavy Machinery.
Parsons' Manganese Bronze Castings a Specialty. Iron Castings up to 50 Tons.

Southwark Foundry and Machine Co.

PHILADELPHIA, PA.

Porter-Allen Automatic Engines, Blowing Engines
Centrifugal Pumps, Weiss Counter-Current Condensers

The Holyoke Fire Hydrant

Simple, Durable, Satisfactory in Every Respect.

Manufactured by
Norwood Engineering Co.
FLORENCE, MASS.

Send for Circulars

Flexible Joints

For Steam, Water, Oil, Air, etc.
Have been used with great success on Hydraulic Dredges

We also Manufacture Sluice Gates

Coldwell-Wilcox Co.
NEWBURGH, N. Y.

What is LEAD WOOL, anyhow?

Eclipse and Perfection

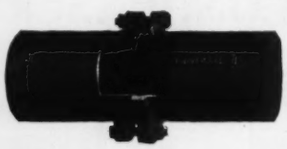
Fire Hydrants
Yard Hydrants
AND
Street Washers

"Tried and found the best."

High-Grade Material and Workmanship
SUBSTANTIAL

Repairs can be effected without digging up Hydrant.

Write for Catalog and Particulars
Manufactured by
JOHN C. KUPFERLE
Established 1857
ST. LOUIS, MO.



UNIVERSAL PIPE

For Water, Gas, Compressed Air, etc.

Universal Cast Iron Pipe is joined iron to iron without the use of packing in any form, making a joint easily deflected in any direction and consequently unaffected by jar, vibration, uneven settling or expansion and contraction. The pipe can be installed by unskilled labor in less than half the time required to make calked joints. This, together with the saving in the cost of repairs, makes Universal Pipe as economical as it is efficient.

Write for catalogue and booklet, "The Leaky Joint Problem and How Solved."

CENTRAL FOUNDRY CO.

116 Nassau Street
New York City

87 North May Street
Chicago

PUT A "DARLING" PATENTED Gate Valve In any place where all others have failed to keep a TIGHT VALVE.

The Darling Pump & Mfg. Co., Ltd.
Box B. Williamsport, Pa., A-2

THE COST OF PIPE SEWERS

(including excavation, furnishing, laying and back-filling) may be readily determined from

KIRCHOFFER'S DIAGRAM

which is based upon data obtained from several hundred bids, wherein depth of trench and size of pipe were specified.

Plate paper, price 25 cents.

ENGINEERING NEWS PUBLISHING COMPANY
220 Broadway, New York

NATIONAL WOOD PIPE CO.

Woodward Patent Machine Banded
Wheeler Patent Continuous Stave
Bored Wood Water Pipe

San Francisco Office, 301 Market Street
Los Angeles Office, Sixth and Mateo Streets
Puget Sound Office, Olympia, Wash.

A Booklet: "The Whole Story About Wood Pipe," Mailed Free Upon Request

WOOD PIPE

Made from California Redwood or Selected Puget Sound Yellow Fir.

WOOD WATER PIPE

For Irrigation, Municipal Water Supply and Power Plants

WRITE FOR CATALOGUE AND PRICES

WYCKOFF WOOD PIPE COMPANY
ELMIRA, N. Y., U. S. A.

Excelsior Wooden Pipe Co.

CONTINUOUS WOODEN STAVE PIPE

For Irrigation, Municipal Water Supply
Hydro-Electric Power Plants and Out-Fall Sewers

Catalogues and Estimates Furnished on Application
Ask for Catalogue No. 2

Offices { Monadnock Building, San Francisco, Cal.
220 Broadway, New York

United States
Cast Iron Pipe & Foundry Co.

Manufacturers of

Cast Iron Pipe

For Water, Gas, Sewage, Culverts Drains, etc.

In all regular sizes, 3-in. to 84-in.

SPECIAL CASTINGS — FLANGED PIPE
FLEXIBLE JOINT PIPE — LARGE CYLINDERS
HEAVY CASTINGS

Works located at

ADDYSTON, OHIO. BRIDGEPORT, ALA. CHATTANOOGA, TENN. LOUISVILLE, KY.
ANNISTON, ALA. BUFFALO, N. Y. CLEVELAND, OHIO. NEWPORT, KY.
BESSEMER, ALA. BURLINGTON, N. J. COLUMBUS, OHIO. SCOTTDALE, PA.
SOUTH PITTSBURG, TENN. SUPERIOR, WIS.

General Offices, 71 Broadway, New York

CABLE ADDRESS, USCIPIPE, NEW YORK

Eastern Sales Office, Land Title Building, Philadelphia, Pa.
Western Sales Office, 638 Rookery, 217 LaSalle St., Chicago, Ill.
Southern Sales Office, Chamberlin Building, Chattanooga, Tenn.
Pittsburgh Sales Office, Murtland Building, Pittsburgh, Pa.
Pacific Coast Sales Office, 507 Union Trust Bldg., San Francisco, Cal.

TAYLOR'S SPIRAL RIVETED PIPE
3 to 40 inches Diameter
American Spiral Pipe Works
Main Office and Works, Chicago
N. Y. Office, 39 Cortlandt St.

AMERICAN CAST IRON PIPE CO.
Manufacturers of
CAST IRON PIPE & FITTINGS
BIRMINGHAM, ALABAMA.

FOUNDRIES — LYNCHBURG, VA. READING, PA.
M. J. DRUMMOND & CO.
MANUFACTURERS OF
CAST IRON
FLANGE
GAS & WATER PIPE
"GLAMORGAN"
FIRE HYDRANTS, VALVES AND VALVE BOXES.
LAMP POSTS AND SEWER CASTINGS.
GENERAL SALES OFFICE, 182 BROADWAY, NEW YORK.

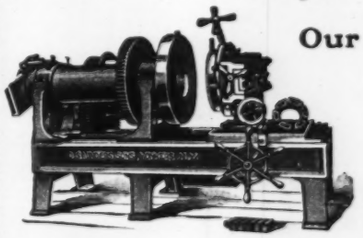
160 BROADWAY. NEW YORK CITY.
WARREN FOUNDRY AND MACHINE CO.
MANUFACTURERS OF
CAST IRON GAS AND WATER PIPE
ALSO ALL KINDS OF FLANGE PIPE AND SPECIAL CASTINGS.

EMAUS PIPE FOUNDRY
GEORGE ORMROD, Pres. and Treas. JOHN D. ORMROD, Supt. J. G. EBERLEIN, Sec.
DONALDSON IRON COMPANY
Manufacturers of Cast Iron Pipe
FLANGE PIPE, LAMP POSTS, Etc.
Special Castings for Water and Gas
EMAUS, LEHIGH CO., PA.
ALSO PIPE CAST VERTICALLY

"JUST ISSUED"
CLOW CATALOGUE
CAST IRON PIPE AND SPECIALS
MANHOLE FRAMES AND COVERS
VALVES, HYDRANTS, ETC.
We carry a large emergency stock of Cast Iron Pipe and Specials at Chicago.
CLOW CAST IRON PIPE
JAMES B. CLOW & SONS, Chicago, New York, Havana

McWANE-LYNCHBURG
CAST IRON PIPE
"QUALITY BEFORE QUANTITY"
"Cinder Iron or other Inferior Grades of Metal" referred to in all Cast-Iron Pipe Specifications are produced by Puddling Mills, Rolling Mills, etc., in the form of "Scrap." There are none of these
MILLS within hundreds of miles of us, but a dozen or more BLAST FURNACES, which, in the words of one of the most eminent metallurgists of our country, "yield foundry iron of unusual excellence and wide reputation," are located right in our "back yard."
OUR CATALOGUE WILL BE MAILED ON REQUEST.
MAIN OFFICE AND WORKS LYNCHBURG, VA.
McWANE PIPE WORKS
EASTERN OFFICE 220 BROADWAY NEW YORK

JAMES McNEIL & BRO. CO.
LARGE SIZE RIVETED STEEL PIPE
STAND PIPE IRON TANKS, BLAST FURNACES, SELF-SUPPORTING STACKS AND HEAVY PLATE WORK.
Pittsburg, Pa.


Our Cutting and... Threading Machine
will turn out a job, large or small, with a greater saving of time, labor and material than any other machine on the market.
Send for Catalogue.
D. SAUNDERS' SONS, YONKERS, NEW YORK

Are You Interested?
IN UP-TO-DATE WATER-WORKS TOOLS
THE PRINCIPAL PLANTS IN THE COUNTRY USE
The Smith Tapping Apparatus — The French Pipe Cutting Machine
O'Neil Steam Caulker — The French Lead Joint Remover
The Economic Lead Furnace — The Corporation Tapping Machine
The Sherrerd & French Valve Inserting Machine, Fire Hydrants, Corporation and Curb Cocks and Brass Goods of Every Description.
Catalogue giving description of above and other water and gas works tools and supplies will be furnished on application
THE A. P. SMITH MFG. CO., Newark, N. J.

THE COST of a "WANT" Advertisement in ENGINEERING NEWS is 1½ cents a word, an insertion, for "Situations Wanted" 3 cts. a word for "Situations Open," and "Miscellaneous Wants."

JOHN FOX. NICHOLAS ENGEL.
JOHN FOX & CO.
CAST-IRON WATER, GAS AND FLANGE PIPES
SPECIAL CASTINGS, FIRE HYDRANTS, VALVES.
GENERAL FOUNDRY AND MACHINE WORK.
253 BROADWAY. NEW YORK CITY.

General Electric Company

DRILL MOTORS

Prentiss Drill equipped with General Electric Company's Type C R Variable Speed Direct Current Motor

The use of the General Electric Motor Drive System enables the operator to enjoy an efficient control of speed in addition to an economical application of power.

The General Electric Company has a motor for every service, a controller for every motor, and engineers to properly combine them for any work.

953

Principal Office: Schenectady, N. Y.

New York Office: 44 Broad Street

Sales Offices in All Large Cities

Arc Lamps to Bu n

if you want that kind. It's the only kind we make. We don't make a lamp that only burns current, takes the energy in and gives none out. You don't want that. We make the kind that people want. Tell us your s.

Fort Wayne Electric Works

"Wood" Systems

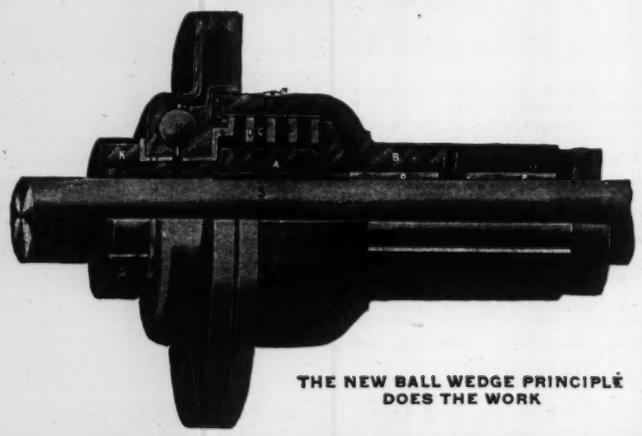
Fort Wayne, Indiana

525

POSITIVE

IN ACTION, NOT AFFECTED BY SPEED OF SHAFT, AND SLIPS IF LOAD EXCEEDS HORSE-POWER OF

CLUTCH



THE NEW BALL WEDGE PRINCIPLE DOES THE WORK

Easily Adjusted, Will Accelerate Machinery Gradually or Instantly

EASILY OPERATED

NO ATTENDANCE EXCEPT OILING

Has Metallic Friction Plates working in oil. Not affected by dust or dampness

SEND FOR CATALOGUE

The Williams Electric Machine Co.

AKRON, OHIO

Branches: Chicago Boston Philadelphia London

Here's a Rugged C & C Motor Driving a Triplex Pump

C & C TYPE "S" PUMP MOTORS

ARE BUILT FOR THE WORK

They Have Large Shafts and Solid Back Bearings to Prevent Straining the Motor

THE C & C ELECTRIC COMPANY

General Office and Works, Garwood, N. J.
New York Office, 149 Broadway

St. Louis Agents, The Pan Electric S. and A. Co.
Pittsburg Agents, H. E. Cole & Co., 1323 Park Bldg.
Cleveland, O., Agent, David Gaehr, 1135 Schofield Bldg.
Denver, Colo., Agent, George W. Thornburgh, 1319 Sixteenth Street.

CURTIS ENGINEERING SPECIALTIES

QUAKER CITY RUBBER CO. 24 Canal Street, BOSTON, MASS.

THE COST OF A "WANT" ADVERTISEMENT in ENGINEERING NEWS is 1½ cents a word, an insertion, for "Situations Wanted" and "Situations Open," and 2 cents a word for "Miscellaneous Wants"

Diaphragm Pumps

A good Diaphragm Pump is one of the most useful parts of your equipment. It is always ready for work; it is portable and inexpensive. If you want one of these pumps or repair parts write us for prices.

Suction Hose for these pumps in *stock*, in lengths from 8 to 20 feet, coupled ready for use. Our Diaphragms are the best that we can obtain.

Harold L. Bond Company,

240 Pearl Street, Boston.

Also Felton's Patent Couplings for Sewer and Conduit Rods and other Sewer Cleaning Appliances.

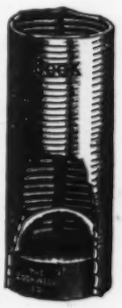
Tenth and Latest Edition

Dixon's latest book, "Graphite as a Lubricant," tenth edition, explains the modern practice of graphite lubrication and quotes experiments by scientific authorities and experiences of practical men. New, fresh, complete information in convenient form. Write for free copy 43-C.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

The Cook Well Co.

St. Louis, Mo., U. S. A.



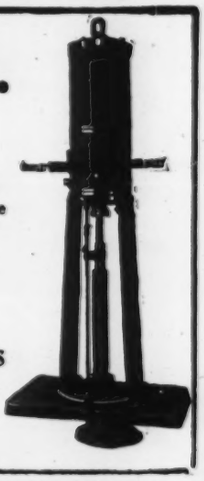
COOK'S SYSTEM OF WELLS

For Cities, Towns, Villages, Railroads, Ice Plants, Breweries and Manufactories

Cook's Patent Brass Tube Well Strainer

Cook's Deep Well Pumping Engines

Estimates Furnished Upon Application
Write for Catalogue and Prices



STOP

That's what our

Ludlow Valves and Hydrants

are for; and they

Do the Work Better than Valves of Other Makes Try Them

Manufactured by

PITTSBURGH MFG. COMPANY

Write for Our Catalogue. Pittsburgh, Pa.

KITSON LIGHT

CHEAPEST IN FIRST COST AND OPERATION

2,000 CANDLE POWER CONTRACTORS PORTABLE LIGHT.

Kitson Hydro-Carbon Heating and Incandescent Lighting Co.
1224-32 CALLOWHILL ST.
PHILADELPHIA, PA.

What is LEAD WOOL, anyhow?

CAST IRON PIPE

THE DIMMICK PIPE CO., BIRMINGHAM ALA.

Makers of Valves and Hydrants

SPECIAL CASTINGS OF EVERY DESCRIPTION

San Francisco, 67 New Montgomery St, Cincinnati, 54 Pickering Bldg.
Philadelphia, 2022 New Land Title Bldg. Gen'l Office, Birmingham, Ala.
San Antonio, Texas Agency, P. O. Box No. 813.

The Massillon Iron & Steel Co.

The Rookery, Chicago, Ill.
Works and Office, Massillon, Ohio

Cast Iron Pipe
For Water, Gas and Culverts.
Flange Pipe and Fittings a Specialty

Heavy Castings
In Loam, Green Sand or Dry Sand for Blast-Furnaces, Rolling Mills, etc.

ENGINEERS
FOUNDERS · MACHINISTS

Ross Regulator Valves

For Steam and Water

Will control the flow and maintain any desired pressure. For car heating it has no equal. No complicated parts. It is easily understood. It is durable, low in price, and always reliable. Made in sizes, from 1 to 24 ins.

ROSS VALVE CO.
TROY, N. Y.

Payne Tapping Machines

Tapping Machines for Gas, Steam and Water Mains

Corporation Cocks
Curb Cocks, Etc.

All Machines Guaranteed and 30 Days' Trial Given.

MODERN TOOL CO.
ERIE, PA.

R. D. Wood & Co.

400 Chestnut Street
Philadelphia, Pa.

MANUFACTURERS OF

HYDRAULIC CRANES, PRESSES, LIFTS, ETC.

Turbines and Water Power Pumps
Sugar House Work
Gas Holders and Gas Machinery
Gas Power Plants with Producers
Mathews' Single and Double Valve Fire Hydrants, Gate Valves, Valve Indicator Posts, Cutting-in-Specials

All Kinds and Sizes of CAST IRON PIPE

WATER WHEEL GOVERNORS

For Electric Light, Power and Railway Stations; also Paper and Textile Mills
Write for references in your locality
THE REPLOGLE GOVERNOR WORKS
Chestnut Street, Akron, Ohio

CURTIS ENGINEERING SPECIALTIES

[illegible] 24 Canal Street, BOSTON

Please mention ENGINEERING NEWS.

"Dunn" Extensible Trench Braces
"Alliance" Extensible Trench Braces

Specialties for Sewer Contractors
Send for Complete Catalog
DUNN MANUFACTURING CO.
Pittsburg, Pa. Allegheny, Pa.

Books on LETTERING
By C. W. REINHARDT. Price, $1.00
By Prof. H. S. JACOBY. Price, $3.00

KEYSTONE Dynamite
Gelatine Dynamite
Rockchief (Granular) Powder

Everything in the Explosive Line

Goods Guaranteed Equal to the Best Made
We have saved money for others, and can save it for you
Write us for prices, giving your delivery point

Keystone Powder Mfg. Co.
EMPORIUM, PA.

DIAPHRAGM PUMPS

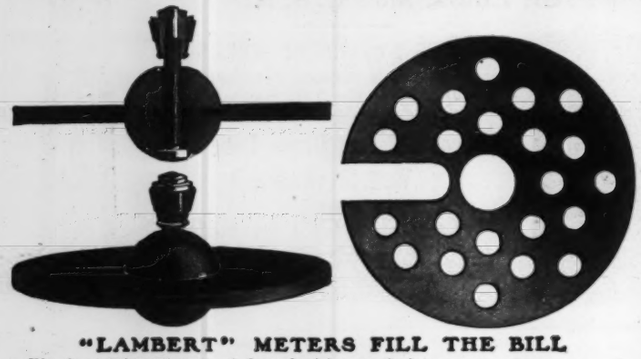
Capacity, 4,000 gallons per hour

For Sewer Departments, Water-Works Railroads and Foundation Builders

Send for Free Catalogue H

BOSTON & LOCKPORT BLOCK CO.
160 Commercial Street, Boston, Mass.
Also, Lockport, N. Y.

DURABILITY and ACCURACY, Not First Cost Are the True Tests of a WATER METER



"LAMBERT" METERS FILL THE BILL

The best Disk Piston, reinforced with a steel plate.
The best design; all parts aligning to a common center.
All "Lambert" Meters are made of the best material, bronze, throughout.
They can be taken apart and reassembled, easily.

THOMSON METER CO., 79 Washington Street, Brooklyn, N. Y.

Coffin Valve Co.

Boston, Mass.

24-inch Coffin Sluice Gate Stationary Screw Fig. 211

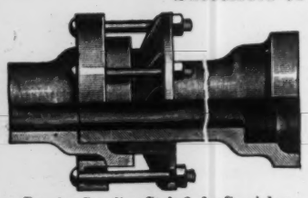
SLUICE GATES
GATE VALVES
FIRE HYDRANTS

Valves Electrically Controlled
A SPECIALTY

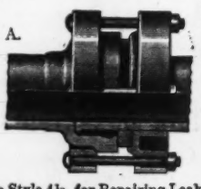
S. R. Dresser Manufacturing Company

Successors to S. R. DRESSER

BRADFORD
PENNA., U. S. A.



State Requirements and Send for Catalogue

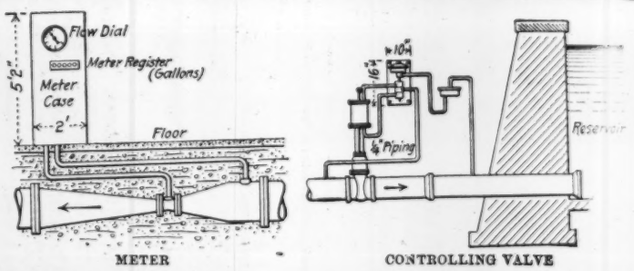


Regular Coupling Style 9, for Special or Dresser Style Cast Iron Pipe

Clamp Style 41/2, for Repairing Leaky Cement or Lead Joints on Regular Hub and Spigot Cast Iron Pipe

Patentees and Manufacturers Various Forms of

Couplings, Clamps, Sleeves and Fittings
For Cast or Wrought Iron Water and Gas Lines



METER CONTROLLING VALVE

Water Meters for Large Pipes
Controlling Valves for Reservoirs or Standpipes
Automatic Air Valves for Water Mains
CATALOGUE ON APPLICATION

SIMPLEX VALVE & METER CO., 112 North Broad St., Philadelphia, Pa.

What is LEAD WOOL, anyhow?

VALVES

made by
The Kennedy Valve Mfg. Co.
50 Beekman Street
NEW YORK

are of superior quality and the prices are right, as can be demonstrated by catalog, actual test and quotations.

WE HAVE ERECTED
STAND-PIPES
at the following places:

Kankakee, Ill.	20 x 120 ft.
Cornwall, Ont.	20 x 120 ft.
Salisbury, N. C.	20 x 100 ft.
Washington, Ind.	20 x 100 ft.
Beaver Dam, Wis.	20 x 84 ft.
Waterford, N. Y.	30 x 52 ft.
Berwick, Pa.	11 x 45 ft.
Homer, N. Y.	25 x 40 ft.
Coburg, Ont.	16 x 118 ft.
Marshall, Mich.	20 x 100 ft.
Hamburg, N. Y.	16 x 125 ft.
Canton, N. Y.	20 x 72 ft.
Rhinelander N. Y.	20 x 65 ft.
Ft. Smith, Ark.	30 x 100 ft.
Brooklyn, N. Y.	16 x 75 ft.

Sharon Boiler Works
SHARON, PA.

The Bourbon Copper & Brass Works Company
MANUFACTURERS OF
FIRE HYDRANTS & STOP VALVES
Water Works and Fire Department Supplies and Extension Valve Boxes
Long Distance 'Phone, No. 1939 618 and 620 E. Front St., CINCINNATI, O.

We Sell the Bonds

Rates furnished on application

The Wall Street Summary

America's Leading Financial Journal

51 BROAD STREET, NEW YORK

Mississippi Valley and Western Department,
401 Globe-Democrat Building, St. Louis, Mo.

The Eureka Water Meter

SIMPLE — STRONG — ACCURATE

BEST ADAPTED FOR

FIRE SERVICES
SUPPLY MAINS
WATER MOTORS
HYDRAULIC ELEVATORS
RAILROAD STANDPIPES

Send for Descriptive Circular

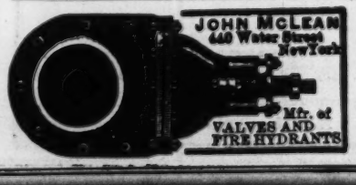
Pittsburg Meter Company
SOLE MANUFACTURERS
East Pittsburg, Pa.

ACCURATE AND DURABLE
WATER METERS

with standard six-hand or straight reading dials, indicating in cubic feet, gallons or liters. Also meters for fuel oil or other liquids.

BUFFALO METER CO.
290 Terrace Buffalo, N. Y.
ESTABLISHED 1892

IF YOU have a Friend not already a subscriber to the Engineering News, but who would be interested in receiving a Sample Copy, send us his name and address on a postal card. We are always pleased to mail a copy of Engineering News free to any Engineer, Contractor or Manufacturer not so fortunate as to be already a subscriber. THE ENGINEERING NEWS PUBLISHING CO., 220 Broadway, New York.



WHEN looking for employees you may find Considerable Help by using the "Want" Pages of ENGINEERING NEWS.

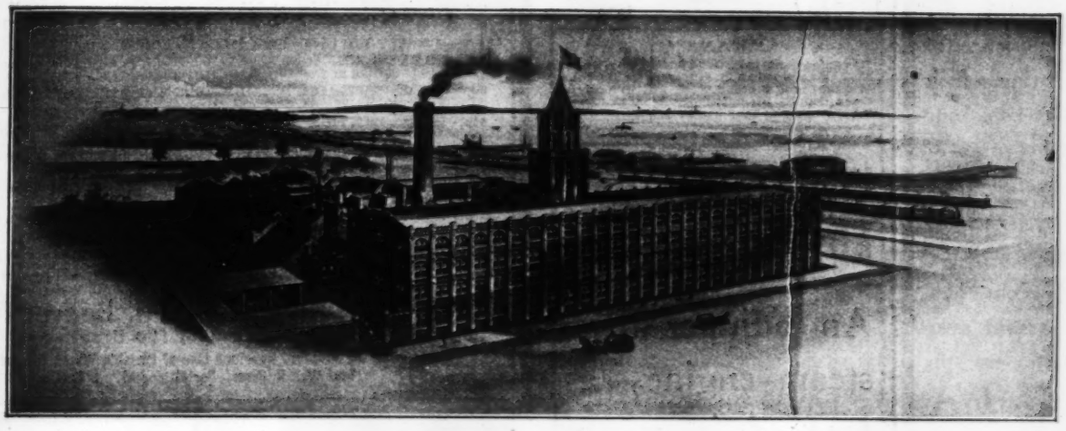
The Record of the Age!

HALF A MILLION

CROWN, EMPIRE, NASH, GEM AND PREMIER

WATER METERS

SOLD TO DATE



The Largest and Best-Equipped Water Meter Factory in America

We manufacture Meters for every requirement of water-works service in all sizes from 5/8-inch to 60-inch.

NATIONAL METER COMPANY

JOHN C. KELLEY, PRESIDENT

NEW YORK	CHICAGO	BOSTON	PITTSBURG	LONDON
81-86 Chambers St.	318 Dearborn St.	159 Franklin St.	4 Smithfield St.	Saracen Chambers

APRIL, 1906

Contractors! We Have Some Information For You

That is, if you are still holding to the old method of excavating rock by benches with ordinary types of rock drills. Our information is for contractors who desire to keep up with the latest and most economical methods of carrying on this class of work, and represents the accumulated experience of many years, during which time we have had our system tested by some of the largest contracting firms in the country, and so pleased were they with the success of the system that, in one case, we sold over forty machines for use on a single job.

Write us for our illustrated prospectus and for our catalog No. 18, and we will take pleasure in sending you some facts and figures that will convince you of our fitness to provide you with machinery which will materially reduce the cost of heavy rock excavation.

Star Drilling Machine Co.

GENERAL OFFICES
AKRON, OHIO
WORKS
AKRON, OHIO CHANUTE, KAN.

NO EXTRA CHARGE
CLASSIFIED ADVERTISEMENTS for Engineering News may be left at any American District Messenger Office in New York City until 9 p. m. every day.
Classified Advertisements in Engineering News bring results.

FOR EXCAVATING

Railway cuts, contract work, splitting rock for lime kilns, and a variety of uses in stone yards, there isn't a better hand-power rock drill made than

THE "VICTOR"

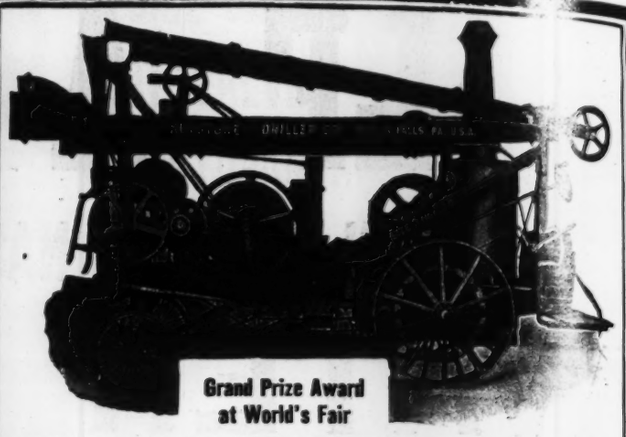
Manufactured by Stow Flexible Shaft Co., Callowhill and 26th St., Philadelphia, Pa.
19

"WANT"
Advertisements in ENGINEERING NEWS cost 1½ cents a word an insertion for "Situations Wanted" and 2 cts. a word for "Situations Open" and "Miscellaneous Wants." Read them weekly as they will help you.

What is an Air Compressor?

An adjunct to a steam engine—as treated in many designs?—or is the engine properly accessory to the air end?

GEO. H. SAMPSON CO.
13 Pearl Street, Boston, Mass.
COMPRESSORS
ROCK DRILLS PNEUMATIC TOOLS
STEAM PUMPS
GUNPOWDER FORCITE POWDER



Grand Prize Award at World's Fair

KEYSTONE BLAST HOLE DRILLER

For work in heavy Railroad Cuts and Canal Excavation Concrete Piling, River and Harbor Exploration Mineral Prospecting, Coal Testing, etc.

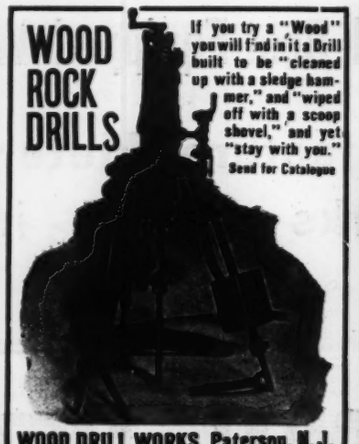
1st.—It is SELF-MOVING. Back-geared for hill climbing.
2d.—The KEYSTONE CROSS TUBULAR BOILER is a quick steamer, will burn any kind of fuel and NEVER REQUIRES SWABBING.
3d.—It is the SPEEDIEST DRILL MADE. Delivers sixty three-foot strokes per minute.
4th.—It has a FRICTION TOOL HOIST, which will withdraw tools instantly from a caving formation, without stopping engine.
5th.—It has an arrangement of TWO SPUDDING SHEAVES, instead of one, which saves 50 per cent. of wear on cable.
6th.—The MATERIAL and WORKMANSHIP are the best obtainable. Our tools have to stand up under the "KEYSTONE GAIT."
7th.—It is BUILT FOR HARD SERVICE. Some of our rigs have been in constant use for over twenty years.
8th.—It is sold under the KEYSTONE GUARANTEE.

Catalog No. 4, of CONTRACTORS' DRILLING MACHINERY, will be sent on request

KEYSTONE DRILLER SHOPS, Beaver Falls, Pa.
New York Office, 170 Broadway
We make the Standard Keystone Line of Portable Water, Oil and Mineral Test Well Drillers. For All Depths. 5 Catalogs.

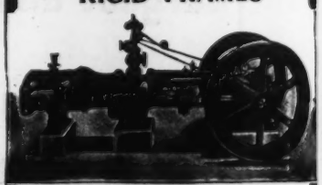
WOOD ROCK DRILLS

If you try a "Wood" you will find in it a Drill built to be "cleaned up with a sledge hammer," and "wiped off with a scoop shovel," and yet "stay with you."
Send for Catalogue



WOOD DRILL WORKS, Paterson, N. J.

RIGID FRAMES



MAKE
Clayton Climax AIR COMPRESSORS

more durable under hard and constant wear than others, and the smooth, quick action of the air valves makes them more efficient. These valves can be taken out and replaced as one piece.

Full information in Pamphlet C 202 E N. Write for it.

Clayton Air Compressor Works, 114 Liberty St., New York
178

Improved Reversible Pneumatic Motor

For DRILLING, TAPPING, REAMING, EXPANDING FLUES, Etc.

Can be operated in close quarters
Economical in the Consumption of Air
Conceded the Best on the Market
Simple, Strong, Powerful, Durable

Helwig's Patent Pneumatic Staybolt Clipper

Cuts off 1¼ in. staybolts, and less, with ease and great rapidity, any desired length. It weighs but 170 lbs. and is easily handled. It has INSERTED KNIVES, which, when worn, can be REPLACED AT SMALL COST. SENT ON TRIAL.

HELWIG MFG. COMPANY, St. Paul, Minn.

The "LITTLE IMP" and "LITTLE JAP"

HAMMER DRILLS

For MINE, TUNNEL, QUARRY, etc.

"LITTLE IMP" on a down hole.

Economy in air consumption is as essential in the hammer drill as in the heavier rock drill. Ingersoll-Rand Hammer Drills, like the Company's standard Rock Drills, have a higher air economy than any other types, resulting in a 25 to 40 per cent. fuel saving for a given number of drills, or enabling a given compressor to run a correspondingly greater number of drills. Combined with this greater air economy are a greater drilling capacity and a greater endurance, making these machines the standards of commercial economy in drills of their type.

The "Little Imp" Hammer Drill is supreme in the "valveless" class. It has but one moving part, resulting in extreme simplicity. Both piston and cylinder are hardened and ground—an exclusive feature resulting in the practical elimination of all wear.

The "Little Jap" Hammer Drill is the standard in the "valve" class. Its improved valve movement gives it a more rapid, powerful blow than any similar type. Unique design and specially treated materials give it an endurance practically eliminating repairs.

"LITTLE JAP" with air feed attachment in a mine.

AIR COMPRESSORS **PNEUMATIC PUMPING SYSTEMS** **AIR TOOLS** **CALYX CORE DRILLS**

INGERSOLL-RAND CO.

11 BROADWAY
NEW YORK

CHICAGO ST. LOUIS PHILADELPHIA PITTSBURG EL PASO CLEVELAND
BOSTON SAN FRANCISCO HOUGHTON, MICH. SEATTLE DENVER BUTTE BIRMINGHAM SALT LAKE LOS ANGELES
MELBOURNE JOHANNESBURG KALGOORLIE, W. AUS. LONDON BERLIN PARIS VALPARAISO LIMA MEXICO CITY

D 64

In Writing to Advertisers Please Mention ENGINEERING NEWS.

AMERICAN AIR COMPRESSORS
Catalog on Request. Simple, Durable, Automatic, Economic for All Purposes
AMERICAN AIR COMPRESSOR WORKS, 26 Cortlandt Street, New York

AIR COMPRESSORS for All Purposes
Vacuum Pumps BURY COMPRESSOR CO., Erie, Pa.

Chester B. Albree Iron Works Co.
1115 Market St., Allegheny, Pa.
We Manufacture
PNEUMATIC RIVETING MACHINES
For Boiler, Structural, Bridge and Tank Work
We Manufacture
BRIDGE RAILING, IRON STAIRS AND STRUCTURAL IRON WORK
We Manufacture
IRON AND STEEL FORGINGS
WM. B. REED, Agent,
26 Cortlandt St., New York
SEND FOR CATALOGUES

WICKES BROS.
MURPHY
Little Champion Rock Drills
THE MOST EFFECTIVE AND DURABLE
NONE BETTER
It will pay you to investigate.
The test of a drill is in what it does, and on its record, this drill is the most economical rock drill on the market.
Write us for complete facts and descriptive circular with specifications, weights and prices
MANUFACTURED AND SOLD BY
WICKES BROS., Jersey City, N. J.
New York Office, 137-139 Liberty Street

SULLIVAN ROCK DRILLS

DRILL FASTER THAN ANY OTHER MAKE IN WORK OF ALL KINDS

Part of a group of 24 Sullivan Drills in the Bas Obispo Cut at Panama.

A West Virginia tunnel contractor recently tried a Sullivan Drill in his heading. The first day it put in 15 feet more of holes in 9 hours than the other drills did in 10 hours; the second day, 20 feet more.

Now that contractor has discarded all his "other" drills for Sullivans. He wishes he had known three years ago that SULLIVAN DRILLS DRILL FASTER THAN ANY OTHER MAKE.

They cost less for repairs, too.

CATALOGUE 51

AIR COMPRESSORS CHANNELERS PLUG DRILLS

SULLIVAN MACHINERY CO.

CLAREMONT, N. H.
NEW YORK
PITTSBURG

KNOXVILLE
ST. LOUIS
JOPLIN, MO.

RAILWAY EXCHANGE
CHICAGO, U.S.A.

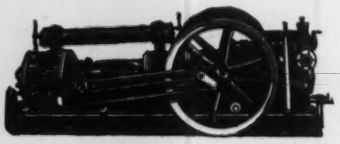
DENVER
SALT LAKE
EL PASO

BUTTE
SAN FRANCISCO
PARIS, FRANCE

The Norwalk Iron Works Co.

SOUTH NORWALK, CONN.

MAKERS OF



AIR AND GAS COMPRESSORS

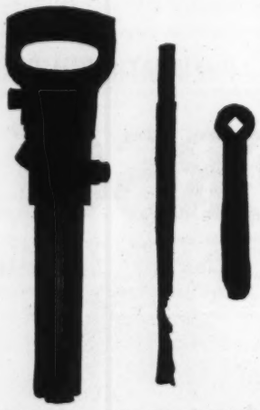
For Any Volume and for Any Pressure

Marvin Electric Drills

MARVIN ELECTRIC DRILL COMPANY, Binghamton, N. Y.

THE IMPROVED

Dallett Plug Drill



Is the kind of tool engineers appreciate. They're thoroughly mechanical in every detail, and of such construction as to practically eliminate the possibility of breakdown or delays.

THOS. H. DALLETT CO.

Philadelphia, Pa.

A Few Reasons Why Cyclone Blast Hole Drillers Break Records

Our continuous solid rod drills made from 2¼-inch steel, and as long as the hole is deep, striking an average of one hundred strokes per minute in a three-inch hole, do "some things" to the rock, regardless of how hard or soft it may be—being able to drill three-inch holes through any and all kinds of material (which size has proven to be the most practical) with the maximum weight and greatest number of strokes per minute. Maximum speed when starting holes is obtained with the extra weights furnished. The Worm Gear and Patent Tilting Bar handle the tools to perfection, and are always under the control of the operator.

Our Non-Traction is hauled up steep inclines, over rough ground, and from hole to hole by its own power. Our Traction Drills are great hill-climbers, and all of our machines are built strong and substantial to withstand the hard usage to which they are subjected, all of which reduce the cost of drill work to the minimum. Write for our catalog and description.

THE CYCLONE DRILL COMPANY
ORRVILLE, OHIO

AIR COMPRESSORS

ALL STYLES—ALL SIZES

ROCK DRILLS

Simplest and Most Economical

McKIERNAN DRILL COMPANY
170 BROADWAY
NEW YORK

Western Representatives, Contractors' Supply & Equipment Company
232 Fifth Avenue, Chicago, Ill.

Multi-Speed Electric Motor

Every conceivable speed between highest and lowest points. A fraction of a turn of the hand wheel makes a proportionate change in the speed. THIS RESULT IS ARRIVED AT without auxiliary wiring Rheostat or Controller giving full rated HP at all speeds. We have many in successful operation.

LET US MAIL YOU DESCRIPTIVE BULLETIN

STOW MFG. CO.
BINGHAMTON, N. Y.

General European Agents: Selig Sonnenthal & Co., 85 Queen Victoria St., London, Eng.

BLAISDELL AIR COMPRESSORS

The Blaisdell Machinery Co.
BRADFORD, PA.

120 Liberty Street, New York — Jos. T. Ryerson & Son, Chicago

Engineering News

is more frequently consulted for

TECHNICAL HELP
MISCELLANEOUS WANTS
SALE OF SECOND-HAND MACHINERY AND EQUIPMENT

than any other Engineering Journal in the United States.

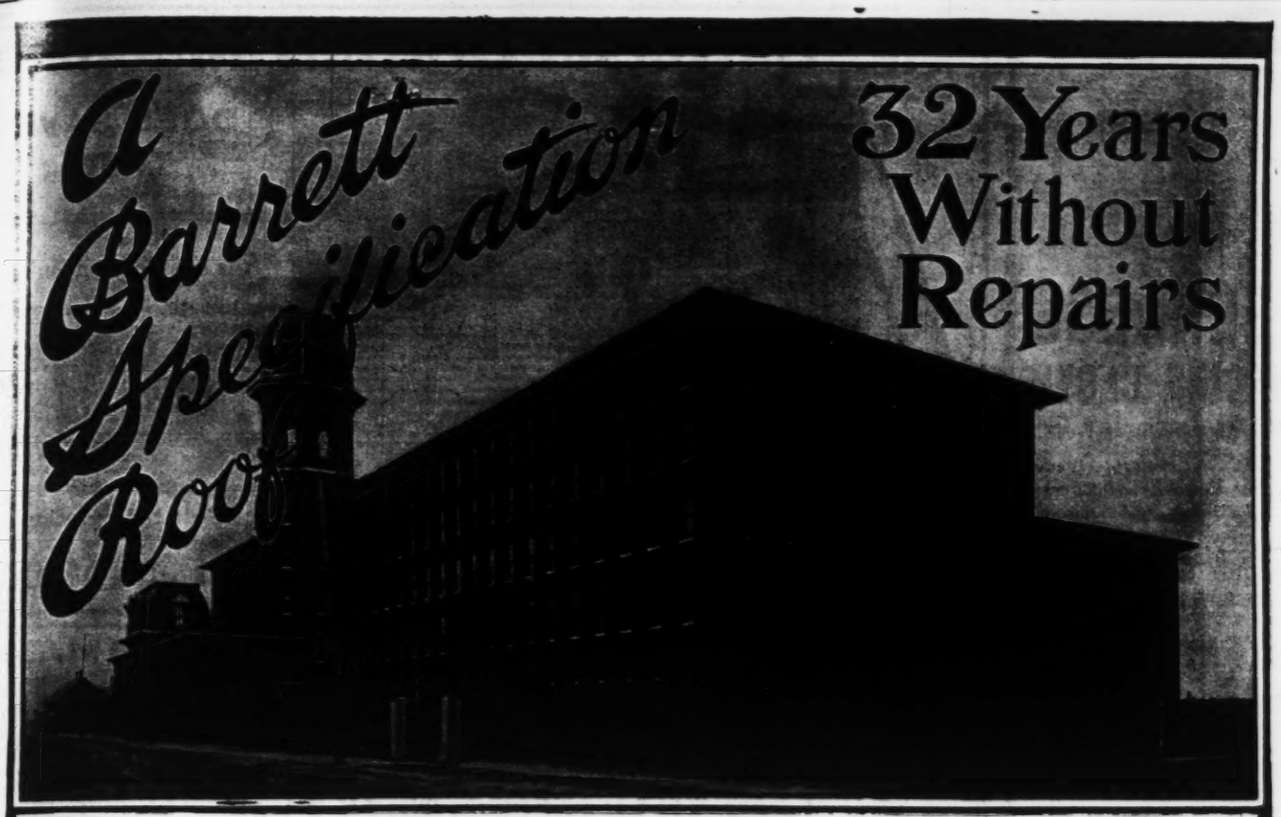
When Looking for a New Position YOU MAY FIND Considerable Help BY USING THE WANT PAGES OF ENGINEERING NEWS

HARDSOCG WONDER AIR HAMMER DRILLS

FOR THE ECONOMICAL EXCAVATION OF ROCK

Write for Full Particulars

Room 78, 66 Broad Street, New York



The buildings shown are the Mechanic Mills at Fall River, Mass. In 1874 they were covered with 50,000 square feet of Gravel Roofing, laid along the lines of THE BARRETT SPECIFICATION.

Last year, *after 32 years of service, with no expense for repairs,* the roof was re-covered with the same material.

What other roofing can show 32 years of service at a total cost of *less than one-fifth of a cent per square foot per year?*

This is the kind of service that has made BARRETT SPECIFICATION ROOFS standard and more widely used on first-class buildings than all the other styles of roofing combined.

When ordering your roof covering, it is well to remember that a BARRETT SPECIFICATION ROOF cannot rust like one of metal, or warp and rot like wood, and that it gives you *six pounds* of material to the square foot, as against *one-half to one pound* in "ready roofings."

Also, and very important, it is self-maintaining, and requires no expense for painting or coating to insure its durability. Any reliable roofer will guarantee a BARRETT SPECIFICATION ROOF, absolutely, for ten years; in other words, it gives real protection at minimum cost.

Illustrated booklet covering the roofing subject thoroughly, mailed free on request to nearest office.

BARRETT MANUFACTURING COMPANY

New York Chicago Philadelphia Cincinnati Minneapolis Cleveland
Kansas City Boston New Orleans St. Louis Allegheny

Made on American Looms

PEERLESS

PEERLESS
TRACING CLOTH

An Altogether AMERICAN Product

The fabric is superior to that used in the imported cloth and the coating and finish are equal to them.

PEERLESS TRACING CLOTH

is perfectly transparent, stands erasures easily and is absolutely free from pin-holes. A trial will be more convincing than the most minute description.

GET A ROLL AND TRY IT

On request we will send you a sample. The cloth is right, the prices are right, and it is an entirely AMERICAN product.

PEERLESS TRACING CLOTH

is fully guaranteed to come up to the standard of the best of the imported cloth in every respect and is cheaper.

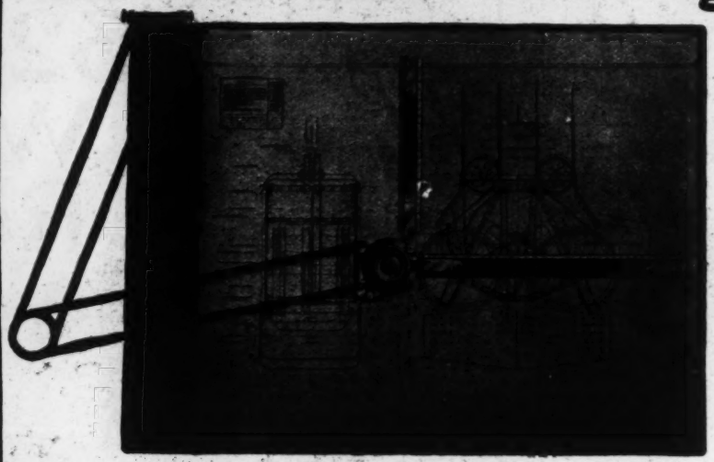
For sale at all the larger Stationers and Architect and Engineering Supply houses. If your dealer does not carry it send us your name and his and we will see that you are furnished with it.

AMERICAN TRACING CLOTH COMPANY

NEW YORK OFFICE, 11 BROADWAY

FACTORY, PATERSON, N. J.

The Universal Drafting Machine



DOES SAVE TIME

It is simple, convenient, accurate. All angular work is as readily executed as straight work.

Send for Full Information

UNIVERSAL DRAFTING MACHINE CO., Cleveland, Ohio, U. S. A.

LUFKIN

STEEL TAPES AND RULES

ARE INDISPENSABLE FOR ACCURATE WORK

Made by **THE LUFKIN RULE CO.**

FOR SALE EVERYWHERE. SEND FOR CATALOG

Saginaw, Mich., U. S. A.
New York. London.

E. G. SOLTMANN

DRAWING MATERIALS

125 E. 42ND ST. NEW YORK

Write for Price List No. 11 of DRAWING MATERIALS and Samples of Papers

ELECTRIC LIGHT PRINTS

PRICES FOR LARGE PRINTS UP TO 4½ x 12 FEET

BLACK PRINTS ON PAPER, sq. foot, 3c.
BLUE PRINTS ON PAPER, sq. foot, 2c.
BLACK or BLUE ON CLOTH, sq. ft., 5c.

Write for Sample Prints

Architects' and Engineers' Supply Co.

DRAWING AND SURVEYORS' INSTRUMENTS.

EXPERT REPAIRING. 1010 GRAND AVE., KANSAS CITY.

Eugene Dietzgen Co.

181 Monroe Street, Chicago

119-121 W. 23d St. New York

New Orleans
San Francisco

Manufacturers and Importers of

Drawing Materials and Surveying Instruments

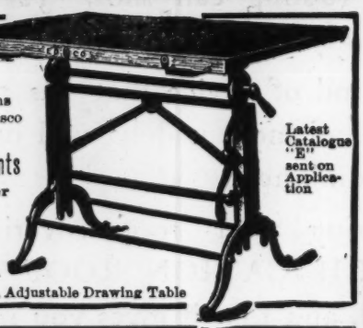
Our RAPID-PRINTING Blue Print Paper has no equal

The Celebrated Vandyke Solar Paper for Positive Blue or Black Prints

Send for descriptive circular and sample prints

Second-Hand Engineering Instruments Bought and Sold

Repairing Promptly Done



Am. Adjustable Drawing Table

Latest Catalogue sent on Application

A. LIETZ & CO.

Scientific Instrument Makers
Have successfully introduced
Special Aluminum Alloy
for Transits and Levels
Acknowledged by Authorities

632-634 Commercial St., San Francisco, Cal.
Est. in 1882. Send for Catalogue

Surveyors' and Engineers' Transits, Levels, Compasses, Chains, Tapes, etc.

Drawing Instruments, Paper, etc.

Field Books, India Ink, Brushes, etc.

L. M. PRINCE

108 West 4th Street
Cincinnati, O.

Catalogue on request.

SURVEYORS INSTRUMENT EXCHANGE

SECONDHAND TRANSITS AND LEVELS

BOUGHT & SOLD

P. O. Box 943 PHILADELPHIA

Keystone and Blue Seal
Blue Print Papers

Are used by those who do not **sacrifice quality** for cheapness

MANUFACTURED BY

KEYSTONE BLUE PAPER COMPANY

CHICAGO BLUE PRINT PAPER COMPANY

New sample book of blue print papers, just from the printer's, sent upon request.

PHILADELPHIA

Established 1870

HELLER & BRIGHTLY

MANUFACTURERS OF

Engineering, Mining and Surveying **INSTRUMENTS**

Catalogue on Application

Cor. Spring Garden St. and Ridge Ave. Philadelphia, Pa.

THE HANNA MFG. CO.

TROY, N. Y., U. S. A.

Engineering and Mining Instruments

Write for Catalogue showing New Designs.

The Only Real Tape for Railroads and Surveyors

Chicago Steel Tape Co.'s Product

CARRIED BY ALL LEADING SUPPLY HOUSES

Send for Illustrated Circulars

6233 Cottage Grove Avenue, Chicago, Ill.

Bausch, Lomb, Saegmuller Company

ROCHESTER, N. Y.

Successors to GEORGE N. SAEGMULLER, Washington, D. C.

Makers of High-Grade Engineering Instruments

T. ALTENEDER & SONS.

INSTRUMENT MAKERS.

PHILADELPHIA

ALTENEDER DRAWING INSTRUMENTS

HAVE YOU OUR CATALOGUE?

BOOKS ON ANY SUBJECT in which you are interested will be sent by us, charges prepaid, upon receipt of price. THE ENGINEERING NEWS PUBLISHING CO.

KEUFFEL & ESSER CO., 127 Fulton St., NEW YORK

Drawing Materials—Surveying Instruments—Measuring Tapes BRANCHES { Chicago, 111 E. Madison St. | St. Louis, 813 Locust St. | San Francisco, 40 Oak St., Cor. Market

K & E Hand Transit Combines prismatic compass, clinometer and altimeter, dial 2¾ inches diameter, compass reads to ½ degree, weighted aluminum case. Very useful for preliminary surveys, locating, filling in details of extensive surveys, etc. When used with a tripod is capable of a considerable degree of accuracy.

Stadia Hand Level Has an erecting 10-inch telescope with 1-inch objective. Adjustable eye-piece, stadia hairs 1:100. Weight, scant 1½ lbs. When set on a staff or tripod, a fairly accurate line of levels can be run. Used in connection with a flexible leveling rod it constitutes an ideal outfit for preliminary work. Can be furnished with leveling attachment. Send for descriptive circular of hand transits and levels.

Our Complete General Catalogue (550 pages) on request

Highest Awards: Grand Prize, St. Louis, 1904; Gold Medal, Portland, 1905

SURVEYING AND MINING INSTRUMENTS

F. E. BRANDIS, SONS & CO.

BROOKLYN, N. Y.

BUFF

ENGINEERING INSTRUMENTS

Buff & Buff Company

Jamaica Plain Station

BOSTON, MASS.

Send for Catalogue 32

The "Buff" builds the best railroads, the largest government works, the deepest mines.

"KOH-I-NOOR" TRACING CLOTH

is Unequaled in Transparency Erasing Qualities, and Freedom from Pin-holes

Ask your Dealer for it

Samples and Prices on Application

L. & C. HARDTMUTH

MAKERS

12 Golden Lane, London, England

34 East 23d Street, New York

Works in cloudy weather, gives closest results, and can be used as Transit without disturbing Solar attachment—need we say more for the Young Mountain Solar Transit?

Catalogue illustrating Transits, Levels, Solar Transits, Plane Tables, and other instruments, also Gradienter and other attachments, together with the principles, methods and performance of adjustments of engineering instruments, and description of Stadia and Gradienter work, with diagrams and tables for finding the difference of level by these methods sent upon application.

YOUNG & SONS, Philadelphia

P. & R. WITTSTOCK

BERLIN, S. 59, GERMANY

Manufacturers of Modern Instruments of Precision for Engineering, Surveying, Mining. Most improved constructions. Highest quality. Moderate prices. Send for our New Price List.

The Ainsworth Transits

TYPE B

Have many improvements not to be found in others.

All parts made to gauge and

STRICTLY INTERCHANGEABLE

Our equipment is modern in every particular and includes many *special machines, tools and instruments* not to be found in any similar factory in

AMERICA

Send for Bulletin BX-10 for full description of the line to

Wm. Ainsworth & Sons

DENVER, COLO., U. S. A.

Prompt attention given to repairing

IF You Use Drawing Inst's

WE WILL SEND FREE

Our Illustrated Catalogue of Profile, Tracing, Blue Print Papers, Squares, Triangles, Scales, and all Draughting Room Furniture, Materials and Supplies. **Write for Same.**

Aloe's Engineer's Transit

$185 NEW MODEL $185

Designed for high-class engineering work. Includes Level and Clamp and Tangent, with five-inch vertical arc with vernier reading to single minutes, graduations on Silvered Brass, in box with Tripod, Plumb-Bob, Sunshade, Magnifier, Screw Driver, and Adjusting Pins. Weight with Tripod complete about 20 pounds.

Aloe's Instruments for 60 years have been the **Standard of the World.**

OUR GUARANTEE
Your Money Back If Wanted

Established 1860

A. S. ALOE CO.

510 Olive St. St. Louis, Mo.

HENRY V. ST. GEORGE

Lithographer and Power Printer

383-5 WEST BROADWAY, NEW YORK

Tracing Sheets

Any size below 30 x 40 inches

Outlined, and titles or firms printed in with "HELIOGRAPHIC INK," insuring best results in blue prints, on your own material, or standard grades furnished, and cut perfect and square. **Send for Circular.**

A BROKEN TAPE

Can be Repaired in a Minute

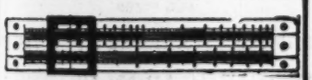
(Patd.)

THE LITTLE GIANT TAPE SPLICE

Attached with knife blade. Does not obstruct the tape. For temporary or permanent repair. Dealers or postpaid. 35c. each, or 3 for $1.00. Give width of tape.

C. B. ALEXANDER, Engineer, B 27, Clearfield, Pa.

"Precision" Slide Rules



5, 8, 10, 15 and 20 inches long

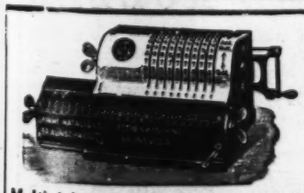
"MIDGET" SLIDE RULES

IMPROVED CONSTRUCTION! ENGINE DIVIDED!

KOLESCH & CO.

138 Fulton Street New York

Write for Circular G



Multiplying and Dividing Machines

Abolish the nerve-killing work of long-hand figuring by using

a BRUNSVIGA Calculating Machine, or

a BURKHARDT Arithmometer

You do not have to verify your figuring, as you do when long-hand is used.

Errors Impossible. (WARNING SIGNAL PREVENTS THEM.)

Trials, Information and References cheerfully given.

CARL H. REUTER

Sole Importer for United States and Canada

822 Land Title Building PHILADELPHIA, PA.

(Beware of Imitations)

ENGINEERING, SURVEYING DRAFTING INSTRUMENTS AND ACCESSORIES

Manufactured and Repaired

BY THE PITTSBURG INSTRUMENT & MACHINE CO.

625-627 Fountain St.

P. Kannmacher, Mgr. Pittsburg, Pa.

Catalogue on application

ELECTRO SUN

BLUE PRINT CO.

44 Broad St., N. Y. Tel. 4975 Broad.

Quick service. Satisfaction guaranteed.

Drafting neatly done.

STADIA DIAGRAM

Corrected for C = 1.20

Range 1000' to 6° and 350' at 32°. Gives difference of elevation and horizontal correction to 0.2 for small and 0.5 for large angles. Accurate, rapid and easy on the eyes. Lithographed on heavy bristol board. Price, $2.50.

CHARLES HART

86 Vesey Street, New York City

Precise Surveying and Engineering Instruments

Established 1871 Reorganized 1890

C.L.BERGER & SONS

Successors to Buff & Berger

Boston, Mass. U. S. A.

Illustrated Catalogue free.

ESTABLISHED 1800

G. G. LEDDER & PROBST

9 PROVINCE COURT, BOSTON, MASS.

Surveying Instruments

Drawing Materials

Architects' and Engineers' Supplies

Second-Hand Transits, Levels, etc.

ALL KINDS OF SURVEYING INSTRUMENTS BOUGHT, SOLD, EXCHANGED AND RENTED

REPAIRING OF SURVEYING AND DRAWING INSTRUMENTS

SEND FOR CATALOGUE

ESTABLISHED 1845

W. & L. E. GURLEY

TROY, N. Y.

Largest Manufacturers in America of

Civil Engineers' and Surveyors' Instruments

Physical Apparatus, Accurate Thermometers, Standard Weights and Measures

Latest Catalogues on application

Continuous, Electric Blue Printing

On the EVERETT-McADAM Machine

Easy to operate, uniform tone, perfect contact, self-contained, small amount of current, noiseless, variable speed, compact, economical.

REVOLUTE MACH. CO., 518 W. 45th St., New York

Further information and list of users upon request

"QUEEN" TRANSITS AND LEVELS

are the results of over fifty years' experience in making High-Grade Scientific Instruments

Send for Illustrated Catalogues of Engineers' and Draftsmens' Instruments and Materials and Office Supplies

QUEEN & CO., INC.

N. W. Corner Eighth and Arch Streets, Philadelphia, Pa.

FILING CABINETS

AND ALL KINDS OF FURNITURE

FOR DRAUGHTSMEN AND ENGINEERS

AMERICAN DRAFTING FURNITURE COMPANY

ROCHESTER, N. Y.

Elliott Electric Blue Print Machine

SIMPLEST IN OPERATION
SIMPLEST IN CONSTRUCTION
BEST WORKMANSHIP

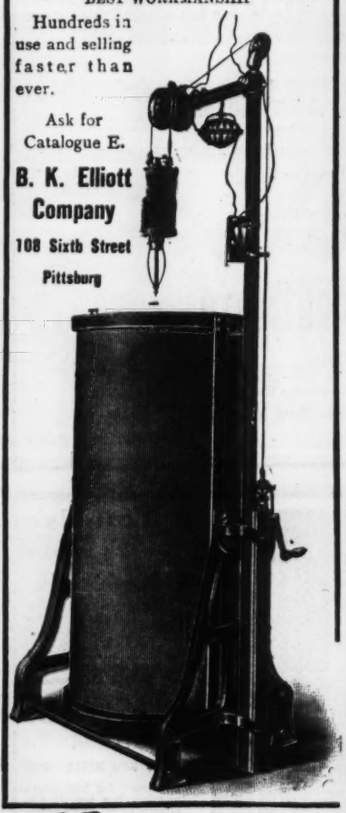
Hundreds in use and selling faster than ever.

Ask for Catalogue E.

B. K. Elliott Company

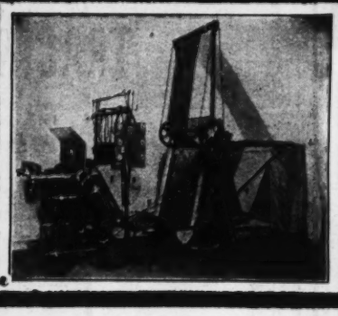
108 Sixth Street

Pittsburg



THE FRANKLIN

Blue Printer, Washer and Drier



MAKES continuous prints of any length; washes, dries and rolls up the finished prints or will handle separate prints. We supply the Printer, and the Washer and Drier separate or combined as desired.

With the Franklin Blue-Printer, prints can be made day or night, 5000 square feet per day, results always uniform. Send for circular.

WILLIAMS, BROWN & EARLE

Dept. E 918 Chestnut St., Philadelphia, Pa.

HERM. PFISTER

Manufacturer of

Surveying and Engineering Instruments

Send for Catalogue

All kinds of repairing promptly done

428 Plum St., Cincinnati, O.

Bushnell's Perfect Letter-Copying Books

Are known and used all around the world. No press required. For more than twenty years these copying books have been growing in popular favor, distancing all competitors. The traveler finds them indispensable. They are also just the thing for private or home use, having no equal. Hundreds of engineers use them when in the field or on construction work, as they meet all requirements in a most satisfactory manner.

Above cut shows the book rolled up as when making a copy.
Full instructions for use are given with each book.
Books will be sent by mail, post-paid, on receipt of price.

	SIZE	PRICE	
No. 2.	10 x 12 inches,	100 leaves, $1.00	Anyone can use them anywhere, making perfect copies
" 20.	10 x 12 "	150 " 1.30	

Every Book fully guaranteed to prove satisfactory

Sold by all Stationers

Buy of your Stationer or send direct to us

ALVAH BUSHNELL CO., Manufacturers

2 North 13th Street, Philadelphia, Pa.

The DUPLIGRAPH PRINTER

It produces 20–100 or more copies on any paper from writing done with typewriter, pen or copying pencil in the quickest possible manner.

KURTZ, LANGBEIN & SWARTZ,

606 WOOD STREET, PITTSBURGH, PA.

STACKPOLE & BRO.

Manufacturers of

Engineering Instruments

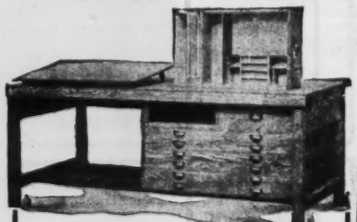
Repairing a Specialty. Send for Circular.

39 FULTON STREET NEW YORK

The Wagenhorst Electric Blue Printer

Makes uniform prints; works day or night; makes prints of all sizes without adjustment; automatic in operation; guarantee with each machine.

Write for Circular C. **J. H. WAGENHORST & CO.,** Youngstown, Ohio



A No. 1 Drawing Table

Seven different styles and sizes of drawing tables to meet the needs of all classes of trade. New and enlarged catalogue just out. Write for one. It will give you full information.

ECONOMY DRAWING TABLE CO.
1303 Utah Street, Toledo, Ohio

Second-Hand Transits, Levels, etc.

Bought, sold or exchanged

Send for list of Second-hand Instruments

Get our prices before ordering

Williams, Brown & Earle
Dept. E. Engineering Supplies
918 Chestnut Street Philadelphia

Macadam and Tandem Type

IROQUOIS STEAM ROLLERS

MACADAM AND ASPHALT

ALL SIZES

COMPLETE ASPHALT PLANTS

IROQUOIS IRON WORKS

LAND TITLE BLDG., PHILADELPHIA

OFFICES

New York Chicago Boston

THE J. C. ULMER CO.

Manufacturers of High-Grade ENGINEERING, SURVEYING, MINING INSTRUMENTS

Manufacturers of Lucas Chain Tapes

Catalog on application

227 Champlain Avenue, S. W.
CLEVELAND, OHIO.

"WANT"

Advertisements in ENGINEERING NEWS cost 1½ cents a word an insertion for "Situations Wanted" and 3 cts. a word for "Situations Open" and "Miscellaneous Wants." Read them weekly as they will help you.

THE UNIVERSAL ROLLER

You wouldn't knowingly buy a balky horse. Would you? Much less should you buy a steam roller that will balk at going down a hill forward and—if the road is narrow—requires to be taken over half the county to get it on the other side of the hill.

THE UNIVERSAL IS THE ONLY ROLLER

of the three-wheel type that will go up hill or down, forward or backward without risk of damage to the boiler.

If you have any doubts about this

GET A CATALOG!

Julian Scholl & Co. | Road Builders' Equipment | 126 Liberty Street, N. Y. Works: Kingston, N. Y.

ACHESON GRAPHITE

ACHESON TRADE ELECTRIC FURNACE GRAPHITE MARK

Manufactured in the Electric Furnace. Write us for full information regarding the use of this material in high grade protective coatings.

INTERNATIONAL ACHESON GRAPHITE COMPANY, NIAGARA FALLS, N.Y., U.S.A.

CARBONIZING COATING

The Preserver of Iron and Steel. The Only Chemically Combined Paint made. When applied under our supervision a guarantee given covering a term endorsed by Bonding Company

Manufactured Only by THE GOHEEN MFG. CO.

Dock House, Billiter St. London, E. C. Toronto, Canada

CANTON, OHIO, U. S. A. 253 Broadway, New York

"WANT" ADVERTISEMENTS cost only 1½ cents a word for "Situations Wanted," Three cents a word for "Situations Open" and "Miscellaneous Wants"

MACK MANUFACTURING CO.

LARGEST PRODUCERS OF THE RECOGNIZED STANDARD

VITRIFIED PAVING BLOCK and BRICK

Unrivaled Facilities Guarantee Quick Delivery of Large Contracts

Rail Block and Brick for Street Car Lines a Specialty

OHIO RIVER SEWER PIPE

IN THE UNITED STATES

GENERAL OFFICES: 42nd and Title Building, Phila. WORKS: New Cumberland, West Va.

DU PONT EXPLOSIVES

FORCITE

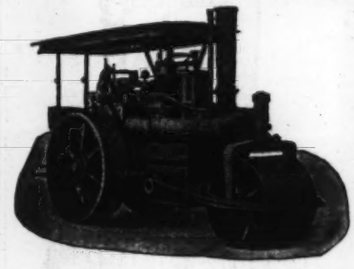
Used in all the Tunnels Driven in and about New York City

DU PONT COMPANY

OFFICES

NEW YORK STEAM ROLLERS

20,000 lbs. to 30,000 lbs.



HAVE Double Engines
Two Speeds
Differential Gear
Steam Dome

Power Economy Durability

Investigate the "New York" before buying

THE "NEW YORK" SCARIFIERS
have double pointed picks

ETNYRE SPRINKLERS

CHARLES LONGENECKER & CO.

150 Nassau Street, New York, U. S. A.

NEW ENGLAND STEAM BRICK CO.

PROVIDENCE, R. I.

LARGEST MANUFACTURERS EAST OF THE HUDSON RIVER

Celebrated Vitrified Beveled-edge BARRINGTON PAVERS

Also semi-Vitrified "NEPONSET" SEWER BRICK

over 50,000,000 of which were furnished for Boston's Great Neponset Valley High-Level Sewer System.

Prompt Delivery

Annual Capacity, 60,000,000

Works: Barrington and Nayatt, R. I.

Buffalo Pitts Rollers

Buffalo Steam Roller Co.

BUFFALO, N. Y.

Eastern Offices { 150 Nassau St., New York / 15 Court Square, Boston

FIRE BRICK SEWER PIPE

HOLLOW TILE FIREPROOFING

VITRIFIED WALL COPING

FIRE CLAY FLUE LININGS

LACLEDE FIRE-BRICK MFG. CO.

ST. LOUIS, MO.

VITRIFIED BRICK BLOCKS for T-RAILS

These vitrified brick blocks are designed especially to lay adjacent to the T-rail, making a marked improvement over the old way of pavement.

Full information furnished on application.

W. H. ARTHUR
Stamford, Conn.

ERIE MACHINE SHOPS

P. W. DIETLY
Proprietor

Send for our Catalogue of Asphalt Rollers and Mixers

"Our 20th Century Roller"

81 WEST 18th STREET, ERIE, PA.

THE PURINGTON PAVING BRICK CO.

GALESBURG, ILL.

MANUFACTURERS OF

Repressed Paving Brick and Blocks

ANNUAL CAPACITY, 75,000,000

BROKEN STONE For Concrete and Macadam. Telephone, 2488 Becter. Send for Circular. CALVIN TOMKINS, 17 Battery Pl., N.Y. Tomkins Cove Blue Stone

CRUSHED TRAP ROCK Quarry on Central R. R. of N. J.
BOUND BROOK CRUSHED STONE CO., Bound Brook, N. J.

JAMES M. PORTER, VITRIFIED PAVING BRICK AND BLOCKS SEWER-PIPE AND OTHER CLAY PRODUCTS Room 1020, Bessemer Building, PITTSBURG, PA.

SHAWMUT VITRIFIED PAVING BRICK WORKS, SHAWMUT PA.
Vitrified Shale and Fire Clay Paving BRICKS and BLOCKS Burned in Yates' Patent Kiln. Samples and Prices on Application. ALFRED YATES, General Manager.

SEWER PIPE AND DRAIN TILE Can quote low prices on the above in either large or small lots. Also PORTLAND AND ROSENDALE CEMENT. JOHN B. JACKSON, 117 Third Ave., Albany, N. Y. NEW YORK STATE DRAIN TILE AND FIRE-PROOFING WORKS

Send for Catalogue of Supplies
THE J. H. STRAIN CO.
19 Elm Street, New York

Specifications for Bridges

By THE OSBORN CO.

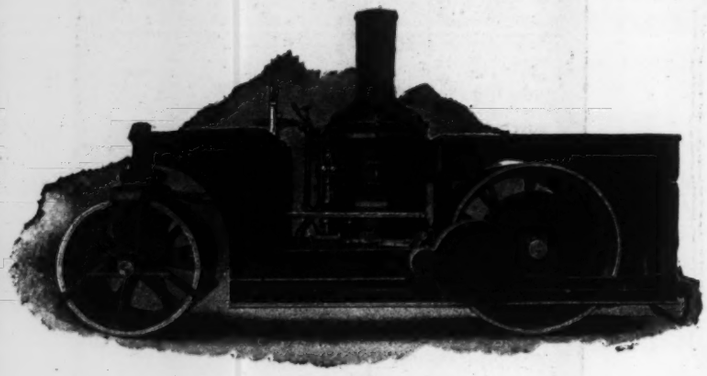
Two Sets. Paper, 8 x 12 Inches. 25 cents each

"General Specifications for Railway Bridges"

"Specifications for Metal Highway Bridge Superstructure"

The Engineering News Publishing Co.
NEW YORK

BOOKS ON ANY SUBJECT in which you are interested will be sent by us, charges prepaid, upon receipt of price. THE ENGINEERING NEWS PUBLISHING CO.

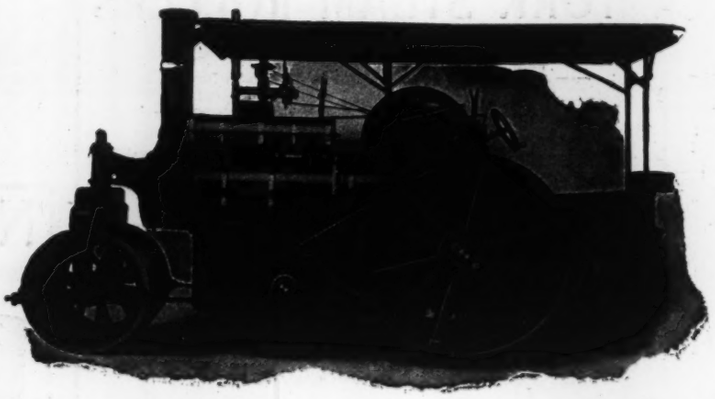


The
Kelly-Springfield
Road Roller Co.

SPRINGFIELD, OHIO, U. S. A.

STEAM
ROAD ROLLERS

All Types
All Sizes
For all Purposes



A Word to the Wise Contractor

HOW TO SAVE MONEY

Blaw Steel Centers used on the First Concrete Sewer Built in Borough of Queens, New York City. Peace Brothers, Flushing, N. Y., Contractors.

Blaw Collapsible Steel Centering Company
Westinghouse Building, PITTSBURGH, PA.

Use the Blaw Steel Centers

And you will cut down your large pay roll. Get your contract done ahead of specified time and complete a job of perfect workmanship. *No worry, strikes, big lumber bills, etc.*

You are your own boss. Use all your ordinary common labor to execute your most difficult work and DO IT FASTER AND BETTER.

Write for prices to lease you our Centers on all your brick and concrete sewer work.

SAVE MONEY

IN FREIGHT, ERECTION, OPERATION, MAINTENANCE

Clear span 870 feet, 460 feet 6 inches above the Zambesi. Load ten long tons. For details see general drawings, our Catalogue, page 5, and reading data, pages 3 to 6.

Can be maintained FOR LESS, operated FOR LESS and installed FOR LESS.

The Balanced Cable Crane. Patented by W. F. Brothers.
Bridging the Gorge of the Zambesi.

During this construction the Balanced Cable Crane not only brought the steel to gangs at both ends, but put over all the material for the R.R., making it possible to complete over 100 miles advance inland before the use of this bridge was possible. It is claimed this individual crane handled as high as 1000 tons some days.

This crane has every good feature to be found in the standard traveling crane, together with the following striking advantages not to be found in any other.
1st. A transverse carriage of any merchandise by setting the bridge at any desired angle, after which the load carriage is all that requires operating until another location is desired.
2d. The maximum and minimum strains are the same; they are static. For further strong features see our latest book.

Write To-Day for Book Giving Details as TO THE WHY AND WHEREFORE

THIS COMPANY GUARANTEES:

FIRST.—That the Balanced Cable Crane has twice the capacity **per H.P.** of any other Cableway.
SECOND.—That it requires not exceeding one-half the labor for operating expenses **per capacity.**
THIRD.—That they have twice the life of any other of **equal capacity.**
FOURTH.—That they do not cost 25 per cent. of any other for maintenance.

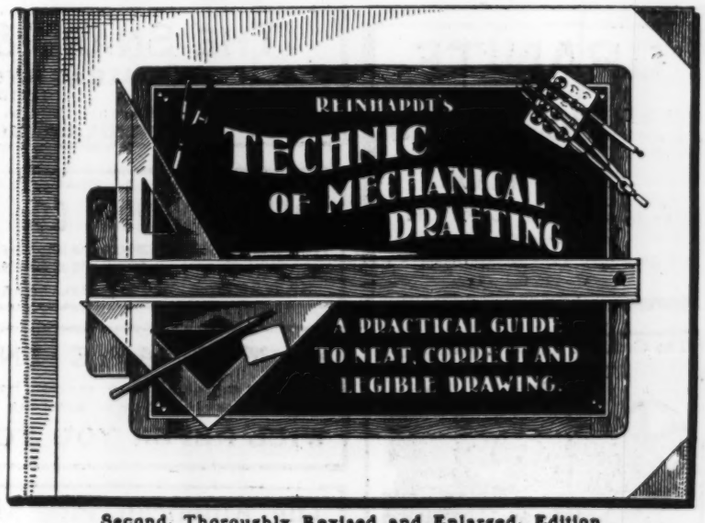
THE BALANCED CABLE CRANE CO.

AGENCIES BEING ALLOTTED **135 William Street, New York, U. S. A.**

SECOND EDITION

"While deprecating any needlessly elaborate finish, the writer advises the use of just sufficient shading and finishing touches to render a drawing thoroughly comprehensible and to preclude any possible ambiguity.'

"The illustrations in this work, quite a number of which have appeared in the columns of 'Engineering News,' are inserted to demonstrate the points involved and have been reduced more or less in size so as to save space. They may however be copied by enlarging to about 3 or 4 times their linear dimensions."



Second, Thoroughly Revised and Enlarged, Edition
90 Text Illustrations, 11 Plates. Price, $1.00

Price, $1.00 Post-paid

"It is of course to be understood, that this book is not a manual for beginners exactly; it serves its purpose best, where used by the draftsman who is familiar with the mathematical principles of mechanical drafting. It will then, as the writer hopes, prove a valuable aid to the rapid production of neat, correct and legible drawings."

(PREFACE.)

TESTIMONIALS

"I have examined the book carefully and am much pleased with it. Mr. Reinhardt is to be congratulated on having clearly, simply and briefly explained the methods he has used in making his drawings remarkable for their great clearness and legibility. It is a book that should be on the desk of every draftsman."—Prof. C. B. Wing, Leland Stanford, Jr., University.

"I find it most excellently adapted to the purpose for which it is intended."—Prof. Walter Flint, University of Maine.

"Am greatly pleased with it; it occupies a field of its own among books on drafting."—Prof. Robt. L. Lund, Vanderbilt University.

"It should be in the library of every draftsman."—Prof. C. W. Marx, Missouri State University.

"It admirably fills a long-felt want."—Prof. John L. Mann, Thayer School of Civil Engineering.

"It is certainly the best compendium of instruction and elegant examples that I have seen."—Prof. Robert Fletcher, Ph.D., Director Thayer School of Civil Engineering.

"It will form a useful supplement to Mr. Reinhardt's 'System of Lettering.'"—Prof. E. H. Lockwood, Sheffield Scientific School.

"Have adopted it as a reference book for our civil engineering students. Your 'Lettering' has been the means of bringing about a distinct lift in the standard of freehand lettering, and I predict a like result in the field covered by your new work."—Prof. W. D. Pence, Purdue University.

"Reinhardt's 'Technic of Mechanical Drafting,' is a book that should be in the drafting department of every engineer's office. It describes those subtle details in execution which constitute the essentials of effective expression in a drawing, both as to truthfulness in its representation as well as its artistic finish. This statement is admirably illustrated by the contrasts shown in Figs. 6, 7, 22 and 46. In view of the important part of detail drawings in all kinds of construction, it is an important service to show how the element of thorough legibility may be assured without necessarily increasing the cost of the drawing. My early experience of six years in a drafting-room leads me to appreciate the importance of many hints which might otherwise appear to be of little, if any, value. Each of the chapters on 'Outline Shading,' and on "Section Lining,' are alone worth the price of the book."—Prof. Henry S. Jacoby, Cornell University.

THE ENGINEERING NEWS PUBLISHING CO., 220 Broadway, New York

THE SESSIONS FOUNDRY CO.
BRISTOL, CONN. *Low Prices*

Sewer and Subway Manhole Castings
Sewer Catch-Basin Castings, Etc.
TO ORDER
Prompt Shipments
Deliver at any Point
Write us for Prices

Cameron Septic Tank Company
A SYSTEM APPLICABLE ALIKE TO THE LARGEST CENTERS OF POPULATION VILLAGES AND PRIVATE COUNTRY RESIDENCES
Plans, Specifications and Estimates Furnished for the Septic Tank System of Sewage Disposal (Patented)
GOLD MEDAL AWARD, ST. LOUIS, 1904
No Chemicals. No Sludge
Low Cost in Construction
Nominal Annual Expenditure
Automatic Throughout
PATENTS THE PROCESS OF SEPTIC TREATMENT IN OPEN OR CLOSED TANKS
Fittings and Apparatus for Same
Automatic Alternating Gear for Filters
H. D. WYLLIE, Gen. Mgr. 812-813 Monadnock Block, Chicago

Arthur McMullen & Co. Specialty: Pneumatic Caisson Foundations
18-21 PARK ROW, NEW YORK Contractors for Bridge and Trestle Work Superstructures, Docks, Etc.

WILLIAM M. BOOTH, B. S. DILLAYE BUILDING SYRACUSE, N. Y.
Power Plant Economies Questions Relating to the Handling, Use of Fuels; Value and Economic Water Softening and Purification.

Stone and Webster Engineering Corporation
ENGINEERS AND CONTRACTORS
Electric Railway, Light and Power Plants
84 STATE STREET, BOSTON, MASS.

With your New Year's Resolutions add one that you will place your wires in a secure place—
UNDERGROUND
G. M. GEST
Expert Electrical Subway Contractor
277 Broadway, New York
Cincinnati, Ohio

GRANITE
For All Purposes
PAVING BLOCKS
We Cater for
EXPORT TRADE
J. LEOPOLD & COMPANY
18 Broadway, New York
Tel., 2886 Broad. Cable Address, Granite, N.Y.
Use Western Union Code

FLEXIBLE JOINTS For Water-Pipes, Gas, Oil, Compressed Air, etc.
Strongest, Cheapest, Easiest to Use.
Contracts taken for Submerged Pipe-Laying
CORRESPONDENCE SOLICITED.
A. L. HOLMES, Grand Rapids, Mich.

Bacon Air Lift System
For pumping from wells and surface sources
Well systems located, designed and equipped
HUDSON ENGINEERING and CONTRACTING CO.
92 William Street, New York
Branch Office, 518 Walnut St., Cincinnati, O.

COLE BROS. 102 Fulton St. NEW YORK
CONTRACTORS FOR
ARTESIAN WELLS and WATER SUPPLY
Wells sunk in earth or rock, any depth, Test Borings for Water or foundations.

STOTHOFF BROS.
FLEMINGTON, N. J.
Artesian Well Contractors
Test Boring Water Supplies
Phone, 44 Flemington

The Cockburn Barrow & Machine Co.
New Concrete Mixer

95 LIBERTY STREET, N. Y. CITY Tel. 1727 Cortlandt

CORNELL'S CASTINGS
FROM 1 Pound to 30 Tons
GOLD SPRING-ON-HUDSON, N.Y.
FACSIMILES OF PATTERNS SUPPLIED
26th St. & 11th Ave. N.Y.

O'ROURKE ENGINEERING CONSTRUCTION CO.
1 WEST 34th STREET, NEW YORK
A Large and Complete Plant for the Construction of Pneumatic and other Foundations
Designs and estimates for all kinds of deep or difficult foundations promptly furnished.
Exclusive Control of Wonder Cylinder Caissons, Obliquo Cutting Edges, Removable of Air Chambers, Safety Air Shafts, and Combination Man and Material Air-Locks for Rapid, Safe and Durable Construction

D. F. McMAHON, Pres. E. W. McMULTY, M. Am. Soc. C. E. B. NAUGHTON, Sec'y
NAUGHTON COMPANY
GENERAL CONTRACTORS
RAILROADS TUNNELS SUBWAYS
PIERS FOUNDATIONS
Phones, 3376-3377 Franklin Rooms, 619-622 Barclay Building
299 BROADWAY, COR. DUANE, NEW YORK

SEWER CASTINGS
MANHOLES, LAMPHOLE FRAMES, INLET PLATES, ETC.
STANDARD PATTERNS ON HAND
PROMPT SERVICE WRITE US FOR PRICES
HILLES & JONES COMPANY
(FOUNDRY DEPARTMENT)
WILMINGTON, DELAWARE

The United Engineering and Contracting Co.
Engineers and Contractors
32 EAST 33d ST., NEW YORK
Telephone, 4780 Madison Sq.
RAILROADS, TUNNELS, BRIDGES, DAMS, DIFFICULT FOUNDATIONS, AND COMPLETE EQUIPMENT OF POWER PLANTS.
Unusual and difficult undertakings, where an Engineering training is of value in the conduct of the work, especially interest us. Plans and Specifications furnished.

THE FERGUSON CONTRACTING COMPANY
FRANCIS M. FERGUSON, President
RAILROAD CONTRACTORS
Keystone Building, Pittsburg, Pa. 69 Wall Street, New York

THE SNARE & TRIEST CO.
CONTRACTING ENGINEERS
BUILDINGS BRIDGES PIERS AND SHEDS
Steel and Masonry Construction Coaling Plants
Main Office, 143 LIBERTY STREET, NEW YORK Havana Office, La Leal Building

ARCHIBALD SALMOND, Pres. J. F. SCRIMSHAW, C. E., Vice-Pres. JAMES SALMOND, Jr., Sec. and Treas.
SALMOND BROS. CO., Engineering Contractors
PLANS, SPECIFICATIONS AND ESTIMATES ON MILL AND FACTORY CONSTRUCTION
SPECIALISTS ON REINFORCED CONCRETE RESERVOIRS AND STORAGE WAREHOUSES
45 Clinton St., NEWARK, N. J. TEL. 99 ARLINGTON ARLINGTON, N. J.

IF YOU ARE IN THE MARKET
for materials, no matter how small, not advertised in Engineering News, write us stating your wants, and we
WILL REFER YOU TO THE RIGHT FIRMS

The American Pipe Mfg. Co., 112 North Broad Street PHILADELPHIA
Engineers and Contractors for Water Works
Manufacturers of PHIPP'S HYDRAULIC PIPE

This is the Best

EXTENSIBLE TRENCHING BRACE
Prompt Shipments Write for Prices
KALAMAZOO FOUNDRY & MACHINE CO. 512 E. Main Street Kalamazoo, Mich.

THE ABBOT-GAMBLE CO. 32 Broadway, New York City 630 Chestnut St., St. Louis, Mo.
CONTRACTORS HAMILTON R. GAMBLE
FRED. W. ABBOT, Pres.; Assoc. M. Inst. C. E.; M. Am. Soc. C. E. Secretary and Treasurer
WE REQUEST OF ENGINEERS opportunities to bid on all kinds of Contract Work; especially complicated work where an engineering skill of a high order, as well as absolute responsibility, is required.

TECHNICAL LITERATURE

·A·MONTHLY·REVIEW·OF·CURRENT·TECHNICAL·PUBLICATIONS·

HARWOOD FROST, Editor and Publisher

The purpose of "TECHNICAL LITERATURE" is to add to the educational value and general interest of the Technical Press by presenting reviews and comments on the most important matters treated in the various high-class technical publications.

An Illustrated Monthly containing

A Review and Index of Important Articles in the Current Technical Journals.

This review will cover a wide range of literature, and will be made of interest to every person engaged in any line of technical work or study, greatly extending the present narrow limits of his reading by giving him access to a volume of material that would otherwise never come to his attention.

Reviews and Announcements of New Scientific Books.

Reviews of new books will be characterized by a policy of impartiality, and will prove of genuine service to the book buyer, instead of misleading him with the very common mere recital of a portion of the author's preface.

All contributed reviews will be signed, and the names of the writers will be sufficient guarantee of the value of their criticisms.

Editorial and Contributed Articles.

Articles along all lines that can be classed under the head of technical literature will be contributed by some of the foremost Engineers and Technical Authors of the country.

Correspondence and Information Regarding Books.

A section will be devoted to a discussion and a general criticism of technical books; replies to inquiries; and lists, with descriptive notes, of the best available literature on different subjects, and other items of interest to the book trade and the book buyer.

Notes from Technical Societies and Colleges.

Notices and abstracts of important papers read at meetings of the societies and descriptions of special work being carried on in the different engineering colleges.

Biographical and Personal Items, Notices of Trade Publications, Translated Abstracts of Articles in Foreign Journals and other information for Technical Men

A special feature of the first issue will be "A Review of Current Concrete and Reinforced Concrete Books," by L. S. Moisseiff, of the New York Bridge Department

SUBSCRIPTION PRICE

12 Months, $2.00; 6 Months, $1.00; Single Copies, 20 cents

For sale by all newsdealers

Special Offer to Original Subscribers

All yearly subscriptions received BEFORE January 5, 1907, in time to commence with the *first issue*, will be entered for *one dollar*—just half the regular rate.

Commence your subscriptions with the first issue. Order *NOW*. Use the attached coupon.

Technical Literature

19a, 220 Broadway, New York

Return this Coupon with $1.00 BEFORE January 5, 1907.

E. N.

Enclosed find $1.00, for which send me TECHNICAL LITERATURE for one year, commencing with first issue, January 15, 1907.

Name.....

Address.....

To Technical Literature, 19a, 220 Broadway, N. Y. Date.....

Engineering News Book Department

Bridge Design and Construction

AMERICAN RAILROAD BRIDGES. By Theodore Cooper, C. E.
Cloth; 7 x 9½ ins.; 60 pages; 7 Tables; 26 Plates $2.00

BRIDGE AND STRUCTURAL DESIGN. By W. Chase Thomson.
Cloth; 6 x 9 ins.; 88 pages; 76 Illustrations.....$2.00

ENGINEERING STUDIES. By Chas. E. Fowler.
In 12 Parts; Paper; 6 x 11 ins.; 8 Half Tone Plates in each. 6 parts ready, each $0.25

Concrete Construction

CONCRETE BLOCKS, the Manufacture of, and Their Uses in Building Construction. Revised from Articles in Engineering News (1906).
Cloth; 6 x 9 ins.; 200 pages; fully illustrated $2.00

REINFORCED CONCRETE. By A. W. Buel and Chas. S. Hill. Second Edition, Entirely Rewritten (1906).
Cloth; 6 x 9; 450 pages; 300 Illustrations and Plates..$5.00

Drafting and Lettering

TECHNIC OF MECHANICAL DRAFTING. By Chas. W. Reinhardt, Chief Draftsman, Engineering News.
Cloth; oblong, 8 x 11 ins.; 42 pages; 90 Illustrations; 11 full-page Plates $1.00

LETTERING FOR DRAFTSMEN, ENGINEERS AND STUDENTS. By C. W. Reinhardt.
Uniform in size with "Technic of Mech. Drafting"....$1.00

LINEAR DRAWING AND LETTERING. For Beginners. By J. C. L. Fish.
Cloth; 6½ x 10½ ins.; 65 pages; 4 page Plates.....$1.00

Contracting

HANDBOOK OF COST DATA. For Engineers and Contractors. By H. P. Gillette.
Flex. Leather, Gilt Edges; 4¼ x 7 ins.; 640 pages; Illus.$4.00

ENGINEERING CONTRACTS AND SPECIFICATIONS. By Prof. J. B. Johnson.
Cloth; 6 x 9 ins.; 566 pages $3.00

Earthwork

EARTH DAMS: A Study. By Burr Bassell.
Cloth; 6 x 9 ins.; 68 pages; 31 Illustrations $1.00

EARTHWORK AND ITS COST. By H. P. Gillette.
Cloth; 5 x 7½ ins.; 256 pages; Illustrated $2.00

Hydraulics

HYDRAULIC DIAGRAMS for the Discharge of Conduits and Canals. By Chas. Swan and Theodore Horton.
Cloth; 6 x 9 ins.; 45 pages; 17 Diagrams. Second Edition, Revised and Enlarged (1905) $1.00

Municipal Engineering

BRITISH SEWAGE WORKS. By M. N. Baker.
Cloth; 6 x 9 ins.; 150 pages $2.00

MANUAL OF AMERICAN WATER-WORKS (1897). By M. N. Baker.
Cloth; 6 x 9 ins.; 700 pages $3.00

MUNICIPAL YEAR BOOK (1902). By M. N. Baker.
Cloth; 6 x 9 ins.; 350 pages $3.00

Reference Books

EARTHWORK TABLES. By R. S. Henderson.
Stiff Paper; 9 x 12 ins.; 32 pages .....

TABLES AND DIAGRAMS, for Calculating Strength of Beams and Columns. By Benj. F. Winslow.
Cloth; 9 x 12 ins.; 53 pages; 19 full-page Plates .....

TABLES FOR ESTIMATING SEWERAGE WORK. By S. Swaab.
Paper; 4½ x 7½ ins.; 20 pages; 16 Plates of Diagrams..$

TABLES OF LOGARITHMS OF LENGTHS. By Thos. W. Marshall.
Flex. Morocco; obl., 5¾ x 3½ ins. .....$

TABLES OF LOGARITHMS AND SQUARES (in Parallel Columns) of feet, inches and fraction of inches, from 0 to 100 ft., together with a table of the six logarithmic functions and angles, corresponding to given bevels. By Constantine Smoley.
Third Edition (1906); Flex. Morocco; 4½ x 7 ins.; 324 pages $3.00

STADIA TABLES. By Alfred Noble and Wm. T. Casgrain.
Cloth; 5 x 7 ins.; 48 pages $1.00

TABLES OF SQUARES. By John L. Hall.
Flex. Morocco; obl., 5¾ x 3½ ins. $2.00

Railroad Engineering

ECONOMIC THEORY OF RAILWAY LOCATION. By (late) A. M. Wellington.
Cloth; 6 x 8½ ins.; 980 pages; 312 Illustrations $5.00

FIELD PRACTICE OF RAILWAY LOCATION. By Willard Beahan.
Cloth; 6 x 9 ins.; 260 pages; 43 Illustrations and 7 Folding Plates $3.00

RAILWAY RIGHT OF WAY SURVEYING. By Albert I. Frye.
Cloth; 6 x 9 ins.; 50 pages $1.00

RAILWAY TRACK AND TRACK WORK. By E. E. R. Tratman. Second Edition, Revised and Enlarged.
Cloth; 6 x 9 ins.; 472 pages; 226 Illustrations $3.00

RAILWAY TRANSITION SPIRAL. By Prof. A. N. Talbot.
Flex. Leather; 4 x 6¾ ins.; 110 pages; Fifth Edition (1906), Revised $1.50

Roads and Pavements

ECONOMICS OF ROAD CONSTRUCTION. By H. P. Gillette.
Cloth; 6 x 9 ins.; 40 pages; Illustrated; Second Edition, Enlarged (1906) $1.00

CITY ROADS AND PAVEMENTS. By Wm. Pierson Judson.
Cloth; 6 x 9 ins.; 196 pages; Illus.; Third Edition, Revised (1906) $2.00

Structural Design

DESIGN OF STEEL MILL BUILDINGS. By Prof. Milo S. Ketchum.
Cloth; 6 x 9 ins.; 380 pages; 29 Tables and 185 Illus.....$4.00

STRUCTURAL DESIGNERS' HANDBOOK. By Wm. Fry Scott.
Cloth; 6 x 9 ins.; 166 pages; 51 Diagrams; 35 Tables....$2.00

Surveying

HYDROGRAPHIC SURVEYING. By Samuel H Lea.
Cloth; 6 x 9 ins.; 200 pages; Illustrated $2.00

PLAT AND PROFILE BOOK. By H. F. Dunham.
Flex. Leather; obl., 4 x 9 ins.; 28 pages, profile Paper..$1.00

SURVEYING MANUAL. By Profs. W. D. Pence and Milo S. Ketchum.
Flex. Leather; 4½ x 6½ ins.; 250 pages; Illustrated....$2.00

Tunneling

MODERN TUNNEL PRACTICE. By David McN. Stauffer.
Cloth; 6¼ x 9½ ins.; 314 pages; 135 Illus.; (1906) $3.50

Full details of any of these books and other publications of the Engineering News Publishing Co. will be sent on request; also information regarding any books of a technical or general nature published by other houses.

Book Department

Engineering News Publishing Company

220 Broadway, New York

AKRON, OHIO. 8/1/06.

Engineering News,
220 B'way, New York.

Gentlemen:-

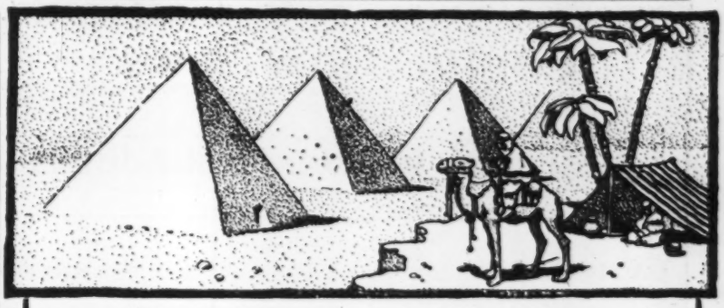
We desire to express to you our great satisfaction with "Engineering News" as an advertising medium. During the last few months we have been running a twelve-inch single column advertisement in your paper, (not a very large space when the size of your pages is considered) yet we are receiving returns far in excess of what we anticipated. We believe, therefore, that you should be congratulated on the quality and quantity of your circulation. You certainly reach the people who are on the lookout for the best methods of carrying on heavy rock excavation -- in other words -- you put us in touch with buyers whom we have no difficulty in interesting in our machines.

Wishing you continued success, we are,

Very truly yours,

HHBH

STAR DRILLING MACHINE CO.,
per Hawkins Secy



"Permanent as the Pyramids — Dry as the Desert"

The Waterproofing Company

have removed to their new quarters

147 East Thirty-fifth Street

where a large stock of

Hydrolithic Waterproof Cement

is kept constantly on hand

Waterproofing against high pressures, and difficult work especially desired

'Phone, 4966 Madison Square

CEMENT AGE

IN THE EYES OF OTHERS

"A real newspaper devoted to the art of the manufacture and use of cement in the broadest manner. I regularly read it and it has a permanent place in my office."

"It is doing a splendid work and I wish to congratulate you."

"The articles furnish a compendium of information so complete on this whole subject of cement that I consider them a valuable contribution and look forward with renewed interest to each number of CEMENT AGE."

"Each number is better than the last and it is scientific without being impractical and practical without being absurd, as some of the trade journals are."

"Your journal is certainly attractive and useful to all manufacturers and users of cement."

This is what men like William Barclay Parsons, Chief Engineer of the Rapid Transit Commission, New York; Theodore Starrett, President of the largest construction company in the country, the Thompson-Starrett Company, New York; George S. Rice, Chief Engineer of the Board of Rapid Transit Commissioners, New York; Richard K. Meade, Chief Chemist, Dexter Portland Cement Company, and C. P. Jameson, General Manager of the Northampton Portland Cement Company, think of CEMENT AGE.

CEMENT AGE is producing the first permanent literature on the subject of cement and concrete which has ever been published. It is indispensable to every engineer, architect, contractor, builder, and owner who is interested in this new and rapidly growing industry — an industry which in the past ten years has increased over 9600 per cent., and which is marking the beginning of a new building era. It covers the entire field in the most comprehensive manner and makes appeal to the layman as well as to the technician.

A sample copy will be sent on receipt of ten cents to cover postage.

BRUCE & BANNING
PUBLISHERS
1 MADISON AVENUE NEW YORK

E. N.

Bruce & Banning
1 Madison Avenue
New York

Enclosed find one dollar ($1.00), for which send me CEMENT AGE for one year, beginning with the issue for

.....

Name.....

Address.....

Date.....

HIGH GRADES OF

NATURAL ASPHALT

THE

A. L. Barber

ASPHALT CO.

Cable Address ALBARCO

17 Battery Place, New York

Telephone 3865 Rector

The Old Machinery or plant, or tools for which you have no present use might be sold or rented to some other reader of Engineering News by the investment of a few dollars on one of our "For Sale" pages.

PILE

SHOES

JANNEY STEINMETZ & CO. Philadelphia

Card It Write us for Prices

"An Expert Applauds the President"

The above is the heading to the leading editorial in "The Troy Times" of March 2, the first paragraph of which is as follows:

"In view of the reckless statements made in connection with the Panama Canal it is highly gratifying to get a clear, dispassionate expression of opinion, founded on careful scientific consideration of the points involved. Such a presentment is made in the current issue of **the Engineering News, a technical publication of such high character that whatever it says carries with it the influence justly attributable to an unbiased and thoroughly competent investigator.** . . . Our contemporary produces much data, with comparison of expense of cost and maintenance, and makes a point **which any layman, no matter how ignorant of engineering science, can readily grasp.**"

Engineering News is read each week by thousands who are not engineers, but desire to keep in touch with the latest discussions on important engineering questions. The layman can keep well informed on such matters by reading our pages.

No one interested, directly or indirectly, in engineering or contracting can afford to be without Engineering News. It reports all important engineering projects, has advertisements from leading employers of Technical help when new men are wanted, and is in every way an up-to-date engineering and contracting newspaper.

Subscription (trial) 10 weeks, $1.00; 6 months, $2.50; 12 months, $5.00

ENGINEERING NEWS, 220 Broadway, New York

Engineering News
Partial List of New Publications

BATTER TABLES — Now Ready

By C. G. Wrentmore, C. E. A useful set of time-saving tables for the structural drafting-room. Complete in every 1-16-in., from 1-16 : 12 to 12:12—in all, 192 tables giving altitude and hypothenuse.

Blue Buckram, 7 x 8½ ins.; 192 pages, with diagrams....$5.00 net.

RAILROAD CURVE TABLES — Now Ready

By R. S. Henderson. Containing a comprehensive table of functions of a one-degree curve, with correction quantities giving exact values for any degree of curve; also trigonometric tables and formulas, and a method of finding any function of a curve, of any degree or radius, without a field book.

The plates from which this work has been printed are photo-reproductions from the author's original tracings; the use of this process eliminates all possibility of typographical errors, and its economy enables the publishers to offer the book at the following prices:

Handbook size (5 x 7 ins.), 69 pages, 10 diagrams. Cloth..... $1.00 net. Flexible leather..... 1.50 net

ECONOMICS OF ROAD CONSTRUCTION

Second Edition, Enlarged—Now Ready

By H. P. Gillette, C. E. This work treats of the Cost, Construction, Repair and Maintenance of Earth, Gravel, Telford and Macadam Roads. It is written by an experienced road engineer, who is also an acknowledged authority on Costs.

Cloth; 6 x 9 ins.; 48 pages, illustrated.....$1.00 net.

UNIVERSAL DICTIONARY OF MECHANICAL DRAWING

Now Ready

By Geo. H. Follows, C. E. This work has appeared serially in the columns of Engineering News during the past two years, and has attracted much attention. The author presents a well-thought-out system of conventions for the consideration of Engineers and Draftsmen, which are conclusions drawn from an extended experience in the management of large drawing offices.

Cloth ; 8 x 11 ins.; profusely illustrated in the text and with full-page plates..... .....$1.00 net.

THE SIX-CHORD SPIRAL — In Preparation

By J. R. Stephens, C. E. Giving the particulars and method of application of a new and improved Railway Transition Curve.

SPECIFICATIONS AND CONTRACTS — In Preparation

By J. A. L. Waddell, C. E., author of "De Pontibus," being a course of lectures delivered before the students of the Rennselear Polytechnic Institute, to which have been added NOTES ON THE LAW OF CONTRACTS, by John C. Wait, M. C. E., LL.B., author of "Engineering and Architectural Jurisprudence." Cloth....$1.00 net

Full particulars of these and other publications of the ENGINEERING NEWS PUBLISHING CO. will be promptly furnished upon application. We are prepared to furnish any technical work that is in print, and to suggest works upon subjects concerning which information is desired.

BOOK DEPARTMENT

Engineering News Publishing Co.

220 Broadway, New York

NOW READY **SECOND EDITION**

THE DESIGN OF STEEL MILL BUILDINGS

AND THE CALCULATION OF STRESSES IN FRAMED STRUCTURES

By MILO S. KETCHUM, C. E.
Dean of College of Engineering, University of Colorado.

Revised and Enlarged.

6 x 9 inches; xiv + 480 pages,
214 illustrations. Cloth, $4.00, net.

More than 100 pages have been added in the present edition, which include Influence Diagrams, The Calculation of Stresses in Pins, Graphic Methods for Calculating the Deflection of Beams, Data on Loads, Foundations, and Saw-Tooth Roofs, Descriptions of Various Buildings, and an Appendix giving the Analyses of 22 Problems in Graphic Statics.

A Work of Decided Value to Designing Engineers, and One Especially Adapted to the Needs of Students.

SEND FOR DESCRIPTIVE CIRCULAR.

ENGINEERING NEWS PUBLISHING CO., 220 Broadway, New York

GENERAL SPECIFICATIONS For **1901 EDITION**

Steel Highway and Electric Railway Bridges and Viaducts — New and Revised Edition

By THEODORE COOPER

Paper, 7x9¼-in., 38 pp.

Price for this 1901 edition, 50 Cents

Any previous edition, 25 Cents

WITH additional matter pertaining to floor systems, tables of loads, etc., and an Appendix containing tables for maximum moments, end shears, etc., for various loadings.

THE ENGINEERING NEWS PUBLISHING CO., 220 Broadway, N. Y.

"TRADE FOLLOWS THE FLAG." LOCATE ON THE WABASH.

The Wabash System occupies a better geographical and strategic position than any other railroad in the United States. With its own rails it reaches all the large cities of the Middle West, from Buffalo and Pittsburg on the East to Omaha, Des Moines and Kansas City on the West. It traverses the Coal and Gas Belts of Pennsylvania, Ohio, Indiana, Illinois, Missouri and Iowa. Its lines extend East and West from Chicago and St. Louis. It is the ***only*** road having lines both East and West of Chicago and St. Louis, and is, therefore, in a position to give its patrons service which no other road can.

Parties contemplating establishment of a new industry, or extension of an old, will find it to their advantage to investigate locations on the Wabash.

WM. F. SCHMIDT, Industrial Commissioner,

210 WABASH BUILDING, ST. LOUIS, MO.

17-1-1

Engineering Schools and Colleges

THE MILITARY COLLEGE OF THE STATE OF VERMONT.

Norwich University, NORTHFIELD, VT.

Elective Courses: Civil Engineering, Chemistry Arts, Science and Letters. Military Discipline with complete routine and instruction for all.

Motto: "I WILL TRY."

Harvard University, THE LAWRENCE SCIENTIFIC SCHOOL,

offers professional courses in Forestry, Engineering, Mining and Metallurgy, Architecture, Landscape Architecture, Chemistry, Geology, Biology, Anatomy and Hygiene (preparation for medical schools), Science for Teachers, and a course of General Science. New and enlarged equipment in all departments. The Catalogue will be sent on application to the Secretary, J. L. LOVE, 16 University Hall, Cambridge, Mass.

Sheffield Scientific School of Yale

UNIVERSITY. Courses in Civil, Mechanical, Sanitary and Electrical Engineering; in Chemistry—Pure and Applied; in Botany, Zoology, Mineralogy, and Geology; in studies preparatory to Mining and Metallurgy; in Biology, especially as preparation for a Medical Course; and in General Scientific Studies, with English, French, Spanish and German. Political Economy, History, etc.

RUSSELL H. CHITTENDEN, Director,
New Haven, Conn.

Worcester Polytechnic Institute,

WORCESTER, MASSACHUSETTS.
A SCHOOL OF ENGINEERING.

Mechanical, Civil, Electrical, Chemical Engineering, and General Science. Extensive Laboratories in Mechanical Engineering, Steam Engineering, Hydraulic Engineering, Physics, General Chemistry, Industrial Chemistry. Well equipped Shops for Moulding, Forging, Machine Construction, Pattern Making. Catalogue mailed on request.

J. E. MARSHALL, Registrar

Pennsylvania Military College.

44th Year begins Sept. 20th, 1906

CIVIL ENGINEERING (C. E.),
CHEMISTRY (B. S.), ARTS (B. S.),
also
PREPARATORY COURSES OF STUDY.

Training: Scholastic, Military, Moral, Athletic.
Results: Vigor of Body, Mastery of Self, Manliness, Power and Efficiency.

"A military School of the best type in every respect."—War Department.

Catalogues of Col. C. E. HYATT, President,
Chester, Pa.

Tufts College,

DEPARTMENT OF ENGINEERING.

Courses in Civil, Mechanical, Electrical and Chemical Engineering. Excellent shop and laboratory equipment.

For catalogue and information, address,
H. G. CHASE, Secretary,
Tufts College, Mass.

New York University
School of Applied Science.

Departments of Civil, Mechanical and Chemical Engineering.

For announcements or other information, address,
CHARLES HENRY SNOW, Dean,
University Heights, N. Y. City.

University of Vermont.

DEPARTMENT OF ENGINEERING.

Thorough courses are offered in Civil, Mechanical and Electrical Engineering. Modern equipment of Shops and Laboratories.

For Catalogues or Department Bulletins address,
J. W. VOTEY, Dean, Burlington, Vt.

The State University of Iowa—
College of Applied Science, IOWA CITY, IOWA.

Thorough courses in ALL BRANCHES OF ENGINEERING, including forest and chemical engineering. New Hall of Engineering with desk accommodation for each student. Hydraulic power plant, consisting of dam across Iowa River, four turbines and two generators, for use and experiment. Send for further information to
GEORGE E. MacLEAN, President.

University of Illinois.

Full courses in Architecture, Civil, Electrical, Mechanical, Municipal and Railway Engineering. Also in Literature, Science, Agriculture, Medicine, Pharmacy, Dentistry. Excellent instruction, buildings, laboratories, shops and equipment.

For catalogue or information, address,
REGISTRAR, Champaign or Urbana, Ill.

Washington University, ST. LOUIS, MO.

SCHOOL of ENGINEERING and ARCHITECTURE

Courses in Civil, Mechanical, Electrical and Chemical Engineering, Architecture, and in Pure Chemistry. Engineering Laboratories and Drawing Rooms. The School of Engineering and Architecture occupies the eleven buildings which furnished ample quarters for various departments of the late World's Fair, including the Gymnasium and Athletic Field. Apparatus new and first-class.

For catalogue and further information, address,
C. M. WOODWARD, Dean.

Lewis Institute, CHICAGO, ILL.

SCHOOL OF ENGINEERING.

Four years' course leading to degree of Mechanical Engineer. In the last two years, elections enable the student to specialize in Electrical, Steam or Shop Engineering. Careful attention given to mature students, not candidates for a degree, who wish to perfect themselves in special lines of work. Catalogue or special information sent on application.

Iowa State College, AMES, IOWA.

Four-years' courses in CIVIL, MECHANICAL, ELECTRICAL and MINING ENGINEERING, and seven courses in GENERAL SCIENCE, AGRICULTURE, and VETERINARY MEDICINE. Extensive shops and laboratory equipment, and a $290,000 new Engineering Hall. 118 instructors, over 700 engineering students. Tuition, $24 per year. Free to Iowa students. For further information address,

A. B. STORMS, President.

Armour Institute of Technology,

CHICAGO, ILLINOIS.

Courses in Electrical, Mechanical, Civil, Chemical and Fire Protection Engineering, and Architecture. Completely equipped laboratories in all departments.

Year-book sent on application.

Clarkson School of Technology.

Thomas S. Clarkson Memorial, Potsdam, N. Y.

Organized under charter of the University of the State of New York. Courses leading to degrees of Bachelor of Science in Chemical, Civil, Electrical and Mechanical Engineering, comprising four years of thorough training and resident college work in theory and practice of engineering. The Clarkson Bulletin, published quarterly, mailed on application. WM. S. ALDRICH, Director.

Lehigh University,

SOUTH BETHLEHEM, PA.

HENRY S. DRINKER, President.

Courses in Civil, Mechanical, Mining, Metallurgical, Electrical, and Chemical Engineering, in Electrometallurgy and Analytical Chemistry. Also Classical and Literary Courses.

For further information, for Registers of the University, and for descriptive circulars of the different courses, address, THE REGISTRAR

College of Engineering,

OHIO NORTHERN UNIVERSITY, ADA, OHIO.

Courses in Civil, Mechanical, Electrical, Mining, Sanitary, Municipal, Architecture.

THOROUGH. PRACTICAL. ECONOMICAL.

School in session the entire year. No time limit for graduation. No fees. Enter any time. We give students what they need, when they need it.

For pamphlet, catalogue, or information, address THOS. J. SMULL, Dean.

Rensselaer Polytechnic Institute,

TROY, N. Y.

A SCHOOL OF ENGINEERING AND SCIENCE

Roads, Railroads, Bridges, Roofs, Arches, Dams, Steam Engines, Electric Engines, Dynamos, Turbines, Foundations, Water-Works, Tunnels, Sewers, Rivers, Canals, Chemical Analysis, Mineralogy, Metallurgy, Assaying.

For catalogue or other information, address
PALMER C. RICKETTS, President.

Rose Polytechnic Institute,

TERRE HAUTE, IND.

Courses in Mechanical, Electrical and Civil Engineering, Architecture and Chemistry. Extensive Shops. Completely Equipped Laboratories in all Departments. Expenses low.

For catalogue or special information, address,
C. L. MEES, President.

Michigan College of Mines,

F. W. McNAIR, President.

Located in Lake Superior district. Mines and mills accessible for practice. For Yearbook and Record of Graduates apply to President or Secretary.

HOUGHTON, MICHIGAN.

University of Michigan, ANN ARBOR, MICH.

DEPARTMENT OF ENGINEERING.

Civil, Mechanical, Electrical, Chemical, Marine and Naval Architecture. Technical work under instructors of professional experience. Work shop, experimental and field practice. Mechanical, physical, electrical, hydraulic, chemical, and metallurgical laboratories. Mold loft and naval tank. For announcements, or other information address, DEPT. OF ENGINEERING

Every Train a Two-Hour Train
From 7 a. m. to 6 p. m.
To PHILADELPHIA
VIA
New Jersey Central
Train Every Hour on the Hour
Leave W. 23d St. 10 minutes before the hour
Stations WEST 23D ST. and LIBERTY ST.
EXCELLENT DINING SERVICE

Testing Laboratories

THE METALLURGICAL LABORATORY,
BUREAU OF INSPECTION.
Inspection of Rails and Fastenings, Cement, Bridges, and other Structural Material.
Chemical Analyses of all kinds.
C. B. Murray, S. T. Fiero, G. P. Maury
611 BAILEY-FARRELL BLDG.
PITTSBURGH, PA.

BUFFALO TESTING LABORATORY, GEO. A. RICKER, C. E., President, Ellicott Square, BUFFALO, N. Y.
Physical, Chemical and Electrical Tests.
Best Agency for Rail Inspection at Lackawanna Steel Co.

MORGAN T. JONES, Resp. Engineer. H. B. WILSON, M. Am. Soc. C. E. J. A. FOULKS, C. E.
THE AMERICAN BUREAU OF INSPECTION AND TESTS,
Wabash Bldg., PITTSBURG. Monadnock Block, CHICAGO. 29 Broadway, NEW YORK.
Inspection of New and Relaying Rails, Cars, Locomotives, Bridges and Structural Material.
Cast Iron Pipe, Lumber, etc. Cement Testing. Chemical and Physical Laboratories.

ROBERT W. HUNT & CO.
1121 The Rookery, Chicago,
66 Broadway, New York,
Monongahela Bank Bldg., Pittsburg,
81 Norfolk House, Cannon St., London, Eng.
Bureau of Inspection, Tests and Consultation.
Robert W. Hunt, Jno. J. Cone, A. W. Fiero, Jas. C. Hallsted, D. W. McNaugher.
Inspection of Rails and Fastenings, Cars, Locomotives, Pipe, etc., Bridges, Buildings and other Structures.
Chemical and Physical Laboratories. Reports and Estimates on Properties and Processes.

LEHIGH VALLEY TESTING LABORATORY. Inspecting Engineers and Chemists.
Standard Cement Testing at the mills before shipment.
Offices: 4 Smithfield St., Pittsburg, Pa. Laboratories: 4th and Linden Sts., Allentown, Pa.

WILLIAM R. CONARD, Assoc. Amer. Soc. C. E.; Assoc. M. Amer. Soc. M. E.,
Inspection of Rails, Bridge Materials, Building Materials of Iron and Steel, Cars, Locomotives, etc.
8 West Broad Street, BURLINGTON, NEW JERSEY.
SPECIALTY:—Inspection of Pipe and Specials, and all Water-works Materials.

BOOTH, GARRETT & BLAIR, Chemists and Engineers. Established 1886.
Chemical Analyses of Ores, Water, Minerals, Metals and Manufactured Products. Tests of Paving Bricks. Crushing, Abrasion Absorption Tests. Tests of Cement and Cement-Making Materials. Land Investigation.
404 & 406 Locust St., PHILADELPHIA, PA.

HENRY S. SPACKMAN ENGINEERING COMPANY,
Industrial Engineers and Chemists,
Formerly Lathbury & Spackman, Inc.
Offices and Laboratories, No. 42 North 16th Street, PHILADELPHIA.

BOOKS

On any subject in which you are interested will be sent by us charges prepaid UPON RECEIPT OF PRICE. All orders are given prompt attention.

THE ENGINEERING NEWS PUBLISHING COMPANY, NEW YORK

Thousands Behind in Orders

WHY are the BEST HOUSES the world over waiting from THIRTY to NINETY days for the delivery of UNDERWOODS?
WHY is there an unprecedented demand for UNDERWOODS?
WHY, with the most modern facilities for increasing factory capacity, is the UNDERWOOD supply so short?

Good common sense answers these questions. Ask any Underwood Branch or Underwood dealer to deliver ten machines at once, and test the Underwood "Supply and Demand" for yourself.

The floor space of the Underwood factory has been doubled within twelve months, but equipping with new machinery and educating new men is necessarily slower work than building brick walls.

Ask the best manufacturers of automatic tools and machinery how long it takes to furnish all that is necessary in their line to thoroughly equip the added factory space of the Underwood Typewriter Company.

Ask any large manufacturer how long it takes to educate sufficient men to double the output of the Underwood Typewriter Company.

Better wait a month, or even two months, than buy the STALE STOCK that some other companies have on their shelves.

Underwood Typewriter Co.
ANYWHERE

ARIZ.

JAMES B. GIRAND, M. Western Soc. C. E., PRESCOTT, ARIZONA.
Consulting, Civil and Mining Engineer.
Examinations and Reports. Cable Address: Railroad and Heavy Concrete Construction. Bedford McNeill Code. "Girand," Prescott.

CAL.

ALSOP ENGINEERING AND CONSTRUCTION CO., Trust Building, LOS ANGELES.
Designing, Superintendence and Construction. Concrete Work.
Water-Works, Irrigation Systems, Sewer Systems. Sewage Disposal and Purification.

DONALD W. CAMPBELL, Civil and Hydraulic Engineer, (Late of Denver.)
SPECIALTIES: Water Supply, Water Power, Sewerage and Irrigation.
Plans, Specifications and Estimates of Cost. 308 TAJO BUILDING,
Inspections Made and Reports Rendered. Broadway and First Street,
Construction Superintended. LOS ANGELES, CAL.

STILLMAN W. CURTIS, Civil and Hydraulic Engineer,
Specialties: Electric Railroads and Hydraulic Work. 805 San Pablo Avenue,
Examinations, Surveys and Reports Made. Estimates of Cost Given. OAKLAND, CALIF.

C. H. MOORE, M. Am. Soc. C. E., SANTA CLARA, CAL. (Near San Francisco.)
Consulting Civil and Hydraulic Engineer. Reports on matters west of Rocky Mountains.

C. P. WIELAND, M. Amer. Soc. M. E., Consulting Engineer. S. E. Cor. 2d and Folsom Sts.,
Steel Frame and Reinforced Concrete Structures. SAN FRANCISCO.

COLO.

HEWITT-CARSTARPHEN CO., Engineers, 221 McPhee Building, DENVER, COLO.
Civil, Mining, and Construction Engineering.

DEL.

T. CHALKLEY HATTON, M. Am. Soc. C. E., Consulting Engineer.
Examinations, Surveys and Reports made, Plans and Specifications prepared and Construction Superintended for Proposed Systems of Water Supply, Drainage, Sewerage and Sewage Disposal and Improved Street Pavements. WILMINGTON, DEL.

D. C.

WASHINGTON, D. C., 1416 F Street, N. W.
PRESSEY & WELLER, Civil and Hydraulic Engineers.
Water-Works, Sewerage, Water Power. Water Purification and Sewage Disposal.
Henry A. Pressey. Francis R. Weller.

GA.

SOLOMON-NORCROSS CO., Civil Engineers, 1020 Candler Building, ATLANTA, Ga.
Steel Construction. Reinforced Concrete, Water Supply, Sewerage, Power Plants and Dams.

ILL.

HENRY A. ALLEN, M. Am. Soc. M. E. Verein Deutscher Ingenieure,
Consulting Mechanical, Electrical and Hydraulic Engineer,
1435 First National Bank Bldg., CHICAGO, ILL.

JOHN W. ALVORD, Mem. Am. Soc. C. E., 127 Hartford Bldg., CHICAGO, ILL.
Sanitary and Hydraulic Engineer.

BION J. ARNOLD, M. Am. Inst. E. E., Consult. Elect. Eng. Transit Building, NEW YORK.
Electric Railways, Power Stations and Transmission Plants. Borland Block, CHICAGO.

THE ARNOLD COMPANY, Engineers, Constructors,
Electrical, Civil, Mechanical. 181 La Salle Street, CHICAGO.

GEORGE M. BRILL, Am. Soc. M. E.,
1184-5 Marquette Bldg., Chicago. Consulting, Electrical and Mechanical Engineer.

R. S. FEURTADO, C. E., Phone, Harrison 6037.
902 Great Northern Bldg., 77 Jackson Blvd., CHICAGO.
Plans, Estimates and Reports on Gas, Electric Light, Water Power and Street Railways.

WM. M. JEWELL, M. Soc. Chem. Ind., Chemical and Consulting Engineer,
Expert in Water Purification. Cable Building,
Filtration and Softening Plants. CHICAGO, ILL.

E. C. & R. M. SHANKLAND, Civil Engineers, Building Construction,
Bridges, Foundations.
THE ROOKERY, CHICAGO, ILL. Examinations and Reports.

DABNEY H. MAURY, M. Am. Soc. C. E., M. Am. Soc. M. E., Consulting Engineer,
Water Works, Increase of Water Supply, Appraisals. PEORIA, ILL.

IOWA

IOWA ENGINEERING CO., Civil, Hydraulic and Sanitary Engineers, CLINTON, IOWA.
CHAS. P. CHASE, Mgr. Specialties—Water-Works, Sewerage and Sewage Disposal.

WM. G. RAYMOND, Consulting Civil Engineer, IOWA CITY, IOWA.
Railway Location, Water Supply, Examinations and Reports.

KY.

MEACHAM ENGINEERING & CONSTRUCTION CO., HOPKINSVILLE, KY.
Specialties: Reinforced Concrete, Sewerage, Water **Civil Engineers and Contractors.**
Supply and Municipal Improvements. Plans, Specifications, Superintendence and Construction.

MASS.

H. S. ADAMS, Civil Engineer, 71 Ames Building, BOSTON, MASS.
Wharf and Dock Construction. River and Harbor Works.

F. A. BARBOUR, Civil and Sanitary Engineer.
Specialties:—Water Supply from a Sanitary Standpoint and Sewage Disposal. Mechanical Analyses of Sands. Tremont Building, BOSTON, MASS.

ERNEST W. BRANCH, M. Am. Soc. C. E., Civil and Sanitary Engineer, 1118 Tremont Bldg.,
Specialties: Sewerage, Sewage Disposal and Drainage. BOSTON, MASS.

PERCIVAL M. CHURCHILL, Assoc. M. Am. Soc. C. E., 6 Beacon St., BOSTON, MASS.
Irrigation, Water Power, Topographic and Hydrographic Surveys, and General Engineering.

CHAS. A. HASKIN, Contracting Engineer.
Exclusive attention given to difficult construction of Shafts and Tunnels in Quicksand and other Water-bearing materials.
Consultation, Plans and Estimates. 16 City Square, Charlestown Dist, BOSTON, MASS.

GEO. E. EVANS, M. Am. Soc. C. E., 98 Milk Street, BOSTON, MASS.
Specialties: Water Supply, Sewerage, Power Plants and Dams.

FRANK L. FULLER, Civil and Hydraulic Engineer, M. Am. Soc. C. E.,
Special Attention Given to Water Supply and Sewerage. 12 Pearl St., BOSTON, MASS.

LOUIS E. HAWES, Civil and Hydraulic Engineer,
101 Tremont Street, BOSTON, MASS

MICH.

GEO. S. PIERSON, M. Am. Soc. C. E., KALAMAZOO, MICH.
Sewers, Sewage Disposal, Water-Works, Water Power, Pavement, Concrete Work.

MINN.

J. T. FANNING, Consulting Engineer, M. Am. Soc. C. E.,
330 Hennepin Avenue, MINNEAPOLIS, MINN.
Plans for Public Water Supplies, Steam and Hydraulic Powers, Electric and Power Transmission.

C. A. P. TURNER, M. Am. Soc. C. E., Consulting Engineer,
Steel Bridges, Buildings, Grain Elevators, 816-818 Phœnix Building, MINNEAPOLIS, MINN.
Warehouses, Mining Buildings, Manufacturing Plants, Sugar Machinery and Factories.

MISS.

RICHARD C. HUSTON, Member W. S. E., Civil Engineer,
HATTIESBURG, MISS.
Specialties: Water Works, Sewerage, General Municipal Work and Appraisals.

MO.

DANIEL BONTECOU, M. Am. Soc. C. E., Civil Engineer,
605-606 POSTAL TELEGRAPH BLDG., KANSAS CITY, MO.
Railroads, Bridges, Power Plants, Examinations and Reports.

CARL GAYLER, Consulting and Designing Engineer, Wainwright Building,
Bridges, Buildings and Foundations. ST. LOUIS, MO.

WILLIAM H. BRYAN, M. Am. Soc. M. E. Lincoln Trust Building, ST. LOUIS, MO.
Water-Works Electric Light and Power, Heating, Ventilating, Examinations, Tests, Reports.

EDWARD FLAD, Consulting Engineer, M. Am. Soc. C. E., M. Am. Soc. M. E.
General Practice, Civil and Mechanical Engineering. 1009-11 Fullerton Bldg., ST. LOUIS, MO.

OWEN FORD, Consulting Engineer, Security Building, ST. LOUIS, MO.
Water Works, Light, Power and Railway Plants; Sewerage. Plans. 120 City Plans
Specifications, Estimates, Valuations, Reports. Installed.

WARREN A. TYRRELL, Consulting and Designing Engineer,
Masonry, Steel, Reinforced Concrete and Timber. 620 Chestnut St., ST. LOUIS, MO.

W. K. PALMER, M. E., Consulting Engineer, 718 Dwight Building
KANSAS, MO.
Mechanical and Electrical Engineering. Electrical Railways and Lighting; Power Plants; Manufacturing Establishments; Heating, Ventilating and Refrigerating Systems; Designing of Machinery; Patent Work; Inspections, Tests and Reports.

S. BENT RUSSELL, M. Am. Soc. C. E. 417 Pine Street,
Water-Works, Water Purification, Shore Protection. ST. LOUIS, MO.

L. H. GARDNER, Consulting Engineer, 811 First National Bank,
OMAHA, NEB.
Power and Refrigerating Plants; Municipal Water and Lighting Plants; Electric Railways; Mills and Special Manufacturing Plants; Machinery Designs, Tests, Inspection and Reports.

WILLIAM P. FIELD, Civil Engineer,
PRUDENTIAL BUILDING, BROAD, cor. BANK ST., NEWARK, N. J.
18 EAST 17th STREET, NEW YORK, N. Y.
Foundations, Roofs, Buildings, Bridges, Railways and Railway Structures.

JAMES OWEN, M. Am. Soc. C. E., Civil and Consulting Engineer,
196 MARKET STREET, NEWARK, N. J.

E. L. CRIDGE, Mill Engineer, People's Bank Building, PASSAIC, N. J.
Electric and Power Transmissions.

WISE & WATSON, Civil and Sanitary Engineers, {COLIN R. WISE. ROBERT M. WATSON.
Sewerage and Sewage Disposal, Water Works and Municipal Engineering.
84 BLOOMFIELD AVENUE, PASSAIC, N. J.

C. C. CONKLING & CO., Consulting and Civil Engineers, Ellicott Square,
C. C. CONKLING, M. Am., Soc. C. E., President. BUFFALO, N. Y.
Surveys, Plans and Reports; Water Front Improvements, Foundations, Railroads, Water Supply, Sewerage.

JOOSS & GATCHELL, Civil Engineers, Ellicott Square, BUFFALO, N. Y.
Preliminary Surveys and Economic Location of Railroads, Water Supply—Sewerage—Highway Construction. Reinforced Concrete Structures, Reports, Plans, Specifications and Estimates.

WILLIAM CURTIS THAYER, Consulting Engineer, 775 Ellicott Sq., BUFFALO, N. Y.
Plans, Specifications, Estimates, Tests, Draughting, Designing, Reports, Railroad Surveys, Steam, Electrical and Hydraulic Plants.

GEO. F. WESCOTT CO., Labor Saving Engineers,
BUFFALO, N. Y.

ASSERSON & ASSERSON, Consulting Engineers,
Peter C. Asserson, U. S. N., M. Am. Soc. C. E. 59-61 Pearl Street, NEW YORK. Henry R. Asserson, M. Am. Soc. C. E.

ASHER ATKINSON, Assoc. M. Am. Soc. C. E., 1 Madison Ave., NEW YORK.
Re-enforced Concrete, Electric Railways, Water Supply, Sewerage.

AUSTIN LORD BOWMAN, M. Am. Soc. C. E., M. Am. Soc. M. E.,
29 Broadway, NEW YORK. Telephone, 2719 Rector. Consulting Engineer,
Railroads, Bridges, General Structural Work. Reports, Plans, Estimates, Superintendence.

JAMES L. BROWNLEE, 29 BROADWAY, NEW YORK
Member Am. Soc. C. E., Consulting and Civil Engineer. Telephone, 722 Broad.
Railway Location and Construction. Water Front Improvements, Docks, Foundations, etc.

CITY-WASTES DISPOSAL CO.
(Organized from the Staff of the late Col. Geo. E. Waring, Jr.)
Consulting and Contracting in Sewerage, Sewage Disposal. 156 FIFTH AVENUE,
Garbage and Refuse Disposal and Street Cleaning. NEW YORK.

THEODORE COOPER, Consulting Engineer,
45 BROADWAY, NEW YORK, N. Y.
Bridges, Viaducts, Buildings Marine Piers, Foundations, etc.

CHAS. L. DUENKEL, M. E., Consulting Engineer,
SPECIALTIES: 120 Liberty Street, NEW YORK.
Inclined Railways, Low and High Pressure Hydraulic Machinery. ELEVATORS.

H. P. DUNHAM, Consulting Civil Engineer, Long Distance Telephone, "6150 Cortlandt."
220 BROADWAY (St. Paul Building), NEW YORK.

JOHN M. FARLEY, Consulting Engineer, M. Am. Soc. C. E., 1 Madison Ave., NEW YORK.
Water Works, Sewerage and Sewage Disposal. Examinations and Reports.

HARVEY FARRINGTON, Consulting Engineer, M. Am. Soc. C. E.,
Water Front Improvements, Docks, Foundations, Masonry, etc. 45 Broadway, NEW YORK

JAMES H. FUERTES, Civil and Sanitary Engineer, M. Am. Soc. C. E.,
Water Supply and Water Purification; 140 Nassau Street,
Sewerage and Sewage Disposal. NEW YORK, N. Y.

RUDOLPH HERING and GEORGE W. FULLER,
Hydraulic Engineers and Sanitary Experts,
Broadway-Maiden Lane Bldg., 170 Broadway, NEW YORK.
Water Supply, Water Purification, Sewerage and Sewage Disposal.
RUDOLF HERING, M. Am. Soc. C. E.; M. Inst. C. E.; M. Can. Soc. C. E. GEORGE W. FULLER, Mem. Am. Soc. C. E.

ALLEN HAZEN and GEORGE C. WHIPPLE,
ST. PAUL BUILDING, 220 BROADWAY, NEW YORK.
Consulting Engineers for Water Supply and Sewage Disposal, particularly from a sanitary standpoint and with reference to purification.

HILDRETH & CO., Consulting and Inspecting Engineers, Philadelphia.
50 BROADWAY, NEW YORK. Pittsburg. Chicago.

WALLACE C. JOHNSON, Hydraulic Engineer,
M. Am. Soc. C. E., Am. Soc. M. E., Can. Soc. C. E., Assoc. M. Am. Inst. E. E.
Consultation Reports, Plans and Superintendence of Construction. NIAGARA FALLS, N. Y.
Water Power Developments, Power Transmission. 45-49 Exchange Place, NEW YORK CITY.

WM. R. HILL, M. Am. Soc. C. E., 948 Sixth Avenue, BROOKLYN, N. Y.
Consultations, Plans, Specifications, Examinations and Reports on Water Works.

The Best Plan To use when bids are wanted for work or for the supplies, machinery, etc., is to use the "Proposal" pages of ENGINEERING NEWS, which goes to the leading and responsible engineers, contractors and manufacturers in America. No money is saved by calling for bids from local firms only, no matter the size of the work. The rate is $2.40 an inch, a time.

HILL & IRVINE, Consulting Engineers. ROBERT T. HILL, FREDERICK B. IRVINE. N.Y. City
Mine Examinations. Designs, Estimates, Inspection and Reports for Steam and Electric Railroads, Steel and Concrete Structures, Power Plants, and Irrigation and Drainage Projects.
25 Broad Street, NEW YORK. Telephone, 1214 Broad.

GEORGE A. JUST, Consulting Engineer, 239 Vernon Avenue,
Steel Structures. Expert Reports. Borough of Queens, NEW YORK CITY.

IVAR KREUGER, Assoc. M. Am. Soc. C. E., 140 Nassau Street, NEW YORK.
Reinforced Concrete and Structural Steel Work.

ALBERT LUCIUS, Civil and Mechanical Engineer, 39 PARK ROW, NEW YORK.
All kinds of Engineering Structures. Plans, Specifications, Estimates, Superintendence.

MANSFIELD MERRIMAN AND CLARENCE W. HUDSON,
45 Broadway, NEW YORK.
Consulting Civil Engineers for Hydraulic, Bridge and Structural Work

WILLIAM D. MARKS, Consulting Engineer and Statistician, 839 Park Row Bldg.
Electric Railways, Electric Light Stations, Gas Works, Oil Motor Cars. NEW YORK CITY

JOSEPH MAYER, No. 1 Broadway, NEW YORK.
Consulting Engineer for Steel Structures, Foundations, Electric Railways.

J. B. McCORD, C. E., 29 Broadway, NEW YORK
Concrete, Water-works, Filtration, Investigations, Estimates, Inspection, Specifications.

WM. F. MORSE, Consulting Engineer, 18 Broadway, NEW YORK.
The Disposal of Municipal, Institutional and Trade Waste. The Utilization of Municipal Refuse.
The Production of Steam Power from City Waste. Disinfection by Steam and Formaldehyde.

NEW YORK SEWAGE DISPOSAL CO., Civil Engineers,
1 Madison Avenue, NEW YORK.

SANDERSON & PORTER, Engineers and Contractors.
Examinations, Reports, Designs, Specifications, Construction, Equipment, Supervision and Management of Railway, Light and Power Properties.
Hydro-Electric Developments. 52 William Street, NEW YORK

ARTHUR J. SLADE, M. Am. Soc. M. E.; Assoc. M. Am. Inst. E. E., 4 East 42d St.,
Consulting, Designing and Supervising Engineer. NEW YORK.

CHARLES SOOYSMITH, Consulting Engineer, Telephone, 43 Rector.
71 Broadway, NEW YORK CITY.

GEORGE A. SOPER, Ph. D., M. Am. Soc. C. E., Consulting Sanitary Engineer, 20 Broadway, NEW YORK.
Telephone, 42 Rector.

SWINBURNE & CLARK, Civil Engineers, Sewerage and Sewage Disposal.
G. W. SWINBURNE, M. Am. Soc. C. E.; M. San. Inst.
E. C. CLARK, Assoc. M. Am. Soc. C. E. 156 Fifth Avenue, NEW YORK.

T. KENNARD THOMSON, M. Am. Soc. C. E.,
Bridges, Buildings and Foundations. 13-21 Park Row, NEW YORK, N. Y.

TRIBUS & MASSA, Civil and Hydraulic Engineers, LOUIS L. TRIBUS,
86 Warren St., NEW YORK. M. Am. Soc. C. E.
Water Supply, Sewerage, Water Power, Reports for Banking Houses. CHARLES G. MASSA.

WALTER E. TRUESDELL, C. E. 160 Fifth Avenue, NEW YORK
Design of Industrial Plants, Power Developments, Reinforced Concrete

BENJ. W. TUCKER, M. E., Consulting Engineer.
Expert on Manufacturing Plants and Special Machinery. Economy in Production and Utilization of Waste a Specialty. 143 Liberty Street, NEW YORK.

WARING, CHAPMAN & FARQUHAR, Civil Engineers,
874 BROADWAY, NEW YORK, N. Y.
Furnish Plans for and Supervise the Construction of Sewerage, Drainage, Plumbing, Water-Works, Etc. Topographical Work and the Laying Out of Towns.

WILLIAMS, PROCTOR & POTTS, Inc., Civil and Sanitary Engineers,
Successors to Williams & Whitman, Inc.
Sewerage Systems Sewage Purification and Disposal. Water Supply. 17 Battery Place, NEW YORK CITY.
Water Purification. Water Power. Water, Sewage and Sand Analyses.

W. W. YOUNG, Engineer, St. Paul Building, NEW YORK.
RAILROADS A SPECIALTY.

JOHN B. NEWHALL, Assoc. M. Am. Soc. M. E., 114-118 LIBERTY ST., NEW YORK.
Underground Water Supply a Specialty. Examinations and Reports. Tel., 6259 Cortlandt.

KNIGHT & HOPKINS, CHARLES W. KNIGHT, C. E. N.Y. State
CHAS. C. HOPKINS, M. Am. Soc. C. E.
ROME, N. Y.
Sanitary and Hydraulic Engineering a Specialty. Designs, Specifications, Estimates and Reports for Water-Works and Sewerage. Construction Superintended. Correspondence Solicited.

HENRY T. BEACH, Consulting Engineer, CITY HALL, SYRACUSE, N. Y.
Iron and Steel Construction, Hydraulic Masonry, Sewers, etc. P. O. BOX 376

JAMES M. CAIRD, Chemist and Bacteriologist, 271 River Street,
Water Analysis and Methods of Filtration a Specialty. TROY, N. Y.

WM. P. MASON, Water Analysis, Rensselaer Polytechnic Institute. TROY, N. Y.
Examinations of, and Reports upon, proposed sources of Water Supply.

J. L. LUDLOW, M. Am. Soc. C. E., Consulting Engineer. N. C.
Water-Works, Sewerage, Municipal Improvements, Water Power. Plans, Specifications, Estimates of Cost and Supervision of Construction. Reports on Water Supplies and the Value and Efficiency of Works in Southern States. Water Filtration and Sewage Disposal.
434 Summit Street, WINSTON, N. C.

THE RIGGS & SHERMAN COMPANY, Consulting Engineers, H. B. Riggs.
Waterworks, Investment Reports, 613 The Nasby W. J. Sherman.
Sewerage and Paving, Steam and Electric Railways. TOLEDO, OHIO. G. A. Gessner, Jr. O.

BENHAM & ADAMS, Civil Engineers, 12-14 Binns Building, Grand Ave.,
W. L. Benham, C. E. | Land Surveys, Mine Surveys, Estimates, OKLAHOMA CITY, OKLA.
H. C. Adams, B. S. | Mapping, Draughting, Designs of Steel, Masonry and Reinforced Concrete Structures, Blue Printing, Brown Printing, Black Printing. Pa.

LEHIGH ENGINEERING COMPANY, Civil and Sanitary Engineers,
Robert S. Rathbun, Charles D. Weirbach, Water Supply, Sewerage and Municipal Work.
Civil Engineers Commonwealth Building, ALLENTOWN, PA.

LUZERNE ENGINEERING CO.,
Civil, Mining, and Contracting Engineers. Glover Building, HAZLETON, PA
R. W. TAYLOR, Manager. Associate Member A. S. C. E.

J. A. COLBY, Inspection of Steel for Bridges, Buildings and Track Materials,
WITHERSPOON BUILDING, PHILADELPHIA, PA.

DODGE & DAY, Engineers,
Design, Equipment and Construction of Factories and Shops. PHILADELPHIA.

B. BRENTNALL LATHBURY, M. Am. Soc. C. E., Land Title Building, PHILADELPHIA.
Cement Projects—Examinations and Reports; Plans and Estimates.

FAIRCHILD & GILCHRIST, Civil and Mining Engineers, Franklin Bldg., 133 S. 12th St. PA.
General Engineering. Rapid Stadia Surveys. Reports on Mining Properties. PHILADELPHIA.

WILSON, HARRIS & RICHARDS, Architects and Consulting Engineers,
Successors to WILSON BROS. & CO. Drexel Building, PHILADELPHIA, PA.

JULIAN KENNEDY,
Engineer,
Cable Address: Engineer, Pittsburg. PITTSBURG, PA., U. S. A.

JAMES B. LADD, Mechanical Engineer, **Consulting Engineers**
DAVID BAKER, Metallugical Engineer, General Mechanical and Metallurgical Engineering, Blast Furnaces, Open Hearth Steel Works, Manufacturing Plants, etc.
Real Estate Trust Building, PHILADELPHIA, PA.

C. P. HOWARD, M. Am. Soc. C. E., Civil and Consulting Engineer,
Railway Location and Construction a Specialty. 704-5 Empire Building, PITTSBURG, PA.

L. C. MOORE, Consulting Engineer, 4 Smithfield Street, PITTSBURG, PA.
Comparative Physical Tests made of Steel Wire Rope.

JOHN N. OSTROM, C. E., Bridge Engineer, 1518 Farmers' Bank Building
PITTSBURGH, PA.
M. Am. Soc. C. E. M. Western Soc. Engineers.
Specifications, Strain Sheets, Estimates, Details, Bridges and Other Framed Structures. Tests and Inspection. Mill and Shop Material. Field Erection. Expert Examination of and Plans for Strengthening Old Superstructure and Substructure. Soundings, Borings, Surveys, Foundations.

PITTSBURG TESTING LABORATORY, Limited,
Inspecting Metallurgical Engineers and Chemists,
325 WATER STREET, PITTSBURGH, PA.
1570 Monadnock Block, Chicago.
906-7 Crozier Bldg., Chicago.
60 New Street, New York.
717 Mutual Bldg., Richmond, Va.
SPECIALTIES: Inspection of Rails and Materials for Bridges, Buildings and other Structures, Boilers, Locomotives, Cars, etc. Inspection of Shop Work and Erection at Bridge Site. Chemical Analysis and Physical Tests of all kinds. Boiler and Engine Tests.

EMIL SWENSSON, C. E., M. Am. Soc. C. E.,
Frick Building, PITTSBURG, PA. Consulting and Constructing Engineer.
Steel Bridges, Elevated Roads, Piers, Docks, Bins, Office and Mill Buildings, etc. Manufacturing Plants, Steam and Electric Railways, Rapid Transit Systems, Terminals and Foundations from Survey to Completion. Examinations, Valuations and Reports for Investment.

JAMES A. WHELAN, Mill and Shop Inspection
on Bridges and Structural Work, also on Locomotives, Boilers and Machinery generally.
Box 24 E. E., PITTSBURG, PA. 576 Seventh Street, BROOKLYN, N. Y.

THE W. G. WILKINS COMPANY, Engineers and Architects,
Branch Office, Huntington, W. Va. Westinghouse Building, PITTSBURG, PA.
Railroad Location, Foundations, Buildings, Bridges, Coal and Coke Plants.
Water Works and Sewerage. Examinations and Reports.

JAMES ARCHIBALD, Civil and Mining Engineer, 424 Jefferson Ave., SCRANTON, PA.
Railways Surveys and Examinations. Water Supply. Reports on Mining Properties.

ELTON D. WALKER, M. Am. Soc. C. E. STATE COLLEGE, PA.
Hydraulic and Sanitary Engineering

FAYETTE ENGINEERING & CONTRACTING CO., Herbert M. Crawford.
Civil Mining and Contracting Engineers, L. C. Mechling.
E. L. Zearley.
UNIONTOWN, PA. Branch Office, BROWNSVILLE, PA.
Specialties: Construction of Coal and Coke Plants and the Development of Coal Properties.

THE WEBSTER ENGINEERING COMPANY, A. J. Webster, M. E., Manager.
Specialty—Conveying, Elevating and Power Plant Equipment.
Plans, Specifications and Estimates Furnished. WILLIAMSPORT, PA.

SAMUEL M. GRAY,
Consulting Engineer for Municipal and Sanitary Work, R. I.
10 Weybosset Street, Room 929 Banigan Building, PROVIDENCE, R. I.

EDMUND B. WESTON, Consulting Engineer M. Am. Soc. C. E., M. Inst. C. E.,
Water Supply, Filtration, Sewerage, Fire Protection, etc. 86 Weybosset St., PROVIDENCE, R. I.

ADELBERT H. OLMSTED, Civil and Consulting Engineer, MARION, S. C.
Water, Municipal and Sewerage Works, Specialties. S. C.

JOHN WHARTON MAXCY, C. E., 904 Binz Building, HOUSTON, TEXAS.
Water Power, Water Supply and Purification, Sewerage and Sewage Purification. TEX.

L. BERNARD SPENCER, Consulting Engineer.
Railroads, Water Works and Power Plants. Office, Eccles Building, UTAH
Reports on Western Industrial and Railroad Projects. OGDEN, UTAH.

JOHN W. HAYS, Member Am. Soc. C. E., No. 8 S. Adams St. PETERSBURG, VA.
Water Power and Municipal Work, including Water-Works, Sewers, Electric Lighting, Streets, Highways and Park Improvements VA.

L. S. RANDOLPH, Consulting Mechanical Engineer, BLACKSBURG, VA.
Member Am. Soc. C. E. Asso. Member Am. Inst. Elec. Eng. Member Am. Soc. M. E.
Specialties: Heating and Ventilating, Hydraulic and Steam Power Plants Compressed Air and Electric Power Transmission and Distribution, Examinations and Reports on Industrial Properties.

CHAS. EVAN FOWLER, M. Am. Soc. C. E., M. Can. Soc. C. E., Consulting Civil Engineer,
Bridges, Structures, Foundations, River and Harbor Improvements.
736-37-38 New York Block. SEATTLE, WASHINGTON, U. S. A. WASH.

H. J. FULLER, M. G. S., M. Inst. C. E. I., Consulting Engineer.
Water Supply, Power, Sewerage. 430-431 Provident Building, TACOMA, WASH.

A. W. ROBINSON, M. Am. Soc. C. E., M. Am. Soc. M. E., Mechanical Engineer.
DREDGING MACHINERY of every type designed for special conditions. CAN.
Plant for Public Work, Gold Dredges. Long Distance Telephone, Uptown 2478.
Cable Address, "Dredge, Montreal." 14 Phillips Square, MONTREAL, CANADA.

EDUARDO J. CHIBAS, Consulting and Contracting Engineer,
Apartado, 110 SANTIAGO DE CUBA. M. Am. Soc. C. E., M. Am. Inst. M. E.
Railroads, Bridges, Wharves, Highways, Water Works, Sewers, Industrial Enterprises. Designs, Estimates, Valuations and Reports. Examinations of Properties for Investment Purposes. CUBA

SMITH & DAVIS, Civil and Mechanical Engineers, MILLER A. SMITH, M. Am. Soc. C. E.
OCTAVIO E. DAVIS, Mechanical Eng.
Examinations, Surveys, Estimates, Reports for Investors or others, on Railways, Lands, Sugar Machinery, etc. Specialties: Economic Location of Public and Private Railways; Designing of Complete Sugar House Plants, and of Improvements on Existing Installations. Aguiar 81. HAVANA, CUBA.

T. J. LAWRENCE, Mining Engineer, TOPIA, DURANGO, MEXICO.
Assays, Surveys, Analysis, Reports, etc. Cable Address, "Ensigo."
Agent of Union Iron Works, San Francisco, Cal. Lieber's Code used. MEX.

J. G. WHITE & CO., Incorporated. Engineers Contractors
43-45 Exchange Place, NEW YORK. Canadian Correspondents,
London Correspondents, Canadian White Co., Montreal.
J. G. White & Co., Ltd., 9 Cloak Lane, Cannon St., E. C. Principal Philippine Office, Manila, P. I.

THE COST OF A "WANT" ADVERTISEMENT in ENGINEERING NEWS is 1½ cents a word, an insertion, for "Situations Wanted" and "Situations Open," and 2 cents a word for "Miscellaneous Wants"

KOPPEL'S

Portable Track

is used for all kinds of industrial purposes, either to remain permanently placed or to be shifted around as the work may require. It occupies very little space, can be laid quickly by any ordinary workman and permit reaching points and corners, which without them would be inaccessible, thereby saving time, labor and money. Every up-to-date **Contractor** uses our **Portable Track** in connection with our **Steel Dump Cars** for carrying concrete and building materials, as shown in the illustrations.

LET US SEND YOU

Our Catalog No. 20 describing our full line of Industrial Railway Equipments which we manufacture—Rails, Steel Ties, Portable Track, Frogs, Switches, Crossings, Turntables, Flat and Dump Cars, etc.

LARGE STOCK

ARTHUR KOPPEL COMPANY

66-68 Broad St., New York
1639 Monadnock Block, Chicago
Machesney Building, Pittsburg

Industrial Cars

This Doubleside Dump Car built in capacities of from ¾, 1, 1½ and 2 cubic yards and 18-inch to 36-inch gauge. Equipped with our patent **Roller Bearings,** saving 50 per cent. of the traction power; for outside and inside journals. Specially adapted for the movement and transportation of clay, earth, stone, sand, coal, ashes, concrete, etc. It is strong, durable and efficient; will dump the **entire load.**

HIGH-GRADE FIRE BRICK

A good article is worth its price—Our No. 1 are No. 1.
Recollections of quality remain long after matter of price is forgotten.

HENRY MAURER & SON, 422 East 23d St., New York

*Every other week.

ALPHABETICAL LIST OF ADVERTISERS.

†Once a month.

Abbott Gamble Co..... 30
Adams Machinery Co..... 74
Adams H S..... 26
Ainsworth, Wm. & Sons..... 25
Alexander Chester B..... 21
Allen Condenser Co..... 10
Allen, O E..... 24
Allentown Iron Works..... *56
Allentown Foundry A..... 36
Allen, John F..... *20
Allen & Ross..... 61
Allis Chalmers Co..... 3
Almy Cement Co..... 4
Aloe S, Co..... 25
Alpha Portland Cement Co..... 60
Alsen Portland Cement..... 84
Alsing Co, J R..... 71
Alsing & Const Co..... 38
Altenheder, Theo, & Sons..... 24
Alvord, John W..... 36
Ambursen Hyd Const Co..... *67
American Air Compressor Wks 21
American Journal of Com..... 61
Am. Asphaltum & Rubber Co. 1
American Blower Co..... 13
American Bridge Co..... 82
Am. Bureau Imp. & Tests..... 38
Am. Cast Iron Pipe Co..... 84
American Cement Co..... 38
American Concrete Caisson Co 4
American Creosote Works..... 67
Am Creosoting Co..... 67
Am District Steam Co..... 7
Am Drafting Furniture Co..... 26
American Gas Furnace Co..... * 4
American Hoist & Derrick Co 63
American Hydraulic Stone Co 78
American Locomotive Co..... 50
American Mfg Co..... 1
American Pipe Mfg Co..... 30
American Process Co..... 66
American Ry Supply Co..... *45
Am School of Corres..... 43
American Sewer Pipe Co..... 52
Am Sheet & Tin Plate Co..... *9
American Spiral Pipe Works. 15
Amer System of Reinforcing 76
Amer Trac Cloth Co..... 24
American Water Soft Co..... †55
Amendaid, James..... 37
Architects & Engrs' Sup Co..24-44
Armour Institute..... 38
Arnold, B J..... 36
Arnold Co..... 27
Arthur, W H..... 36
Asserson & Asserson..... 38
Assoc Expanded Metal Cos.... 78
Atkinson, Asher..... 36
Atlantic Creo & Wood Pres Co 67
Atlantic Equipment Co..... 68
Atlantic, Gulf & Paeme Co.... 68
Atlas Construction Co..... —
Atlas Eng Works..... —
Atlas Portland Cement Co.... 84
Attica Bridge Co..... 80
Austen, Peter T..... 1
Austin Drainage Excav. Co... 55
Austin Mfg Co..... 70
Avery, Chas B..... *44
Babcock & Wilcox Co..... 13
Backus Water Motor Co..... 5
Bacon, Earle C..... 72
Baker, David..... 37
Balance Cable Crane Co..... 24
Baldwin Locomotive Works.. 47
Baltimore Bridge Co..... 74
Baltimore Parro Concrete Co. 74
Barber Asphalt Co, A L..... 35
Barber Asphalt Pav Co...68a-55
Barbour, F A..... 36
Barrett Mfg Co..... *1-2a
Bartlett Steel Co..... 80
Bartlett & Co, A F..... 40
Bartlett, C O & Snow Co..... 60
Bass & Rogers Const Co..... *30
Bausch-Lomb, Saegmuller Co 28
Beach, Henry T..... 37
Beatty, M. & Sons..... 68
Bellefontaine Bridge & Ir Co. 80
Bellefontaine Fdy & Mach Co 48
Belmont Iron Works..... *45 79
Benn & Adams..... 37
Berger, O L & Sons..... 26
Berger Mfg Co..... 79
Berlin Construction Co..... 80
Berquist, A S..... 68
Bethlehem Fdy & Mch Co..... 5
Blays Co, T A..... —
Bianchi & Co, Angelo..... 1
Blaisdell Machinery Co..... 22
Blaw Steel Centering Co.... *28
Blome, S S Co..... 1
Bolte & Meyer Co..... *30a
Bond, Harold L, & Co..... *16
Bonbecon, Daniel..... 36
Bonnot Co..... 71
Booth, W M..... 80
Booth, Garrett & Blair..... 38
Boston Bridge Works..... 70
Boston & Lockport Block Co. 17
Bound Brook Crush Stone Co 27
Bourbon Copper & Brass Wks 18
Bowman A L..... 38
Braden, Jos S..... 45
Bradley Pulverizer Co..... *73
Branch, R W..... 36
Brandis, Sons & Co, F E..... 25
Breier, Marcus..... 32
Briggs, Marvin..... 46
Brill, Geo M..... 30
Bristol Co, The..... 84
Bristol, W H..... 84
Broderick & Bascom Rope Co 61
Brooks, T H & Co..... 70
Brown, J G..... *76
Browning Engineering Co.... 67
Brown Hoisting Mchy Co..... 74
Brownlee, Jas L..... 36
Bryan, H..... 36
Buchanan-Foster Co..... 58
Buckeye Ditcher Co..... 58
Buckeye Engine Co..... †27
Bucyrus Co..... 10
Buda Fdry & Mfg Co..... 80a
Buel & Bull..... 36
Buffalo Forge Co..... 13
Buffalo Meter Co..... 18
Buffalo Steam Roller Co..... 27
Buffalo Steel Co..... 7
Buffalo Testing Laboratory.. 38
Builders Iron Foundry..... 50
Burkhardt's, Geo J Sons..... 11
Burt Mfg Co..... *10
Bury Compressor Co..... 21
Bushnell Co, Alvah..... *36
Byers, John F, Machine Co.. 53
C & C Electric Co..... 16
Cabot, James M..... 37
Cahill, W W, & Son Co..... 37
Cahill, W H Co..... 11
Cameron, Sons & Co, A P Wks..... 9
Cameron Septic Tank Co..... 39
Carbolineum Wood Preserving Co of New York, Inc. } 67
Carbolineum Wood Pres Co 67
Carbondale Chemical Co..... 59
Carlin Machinery & Supply Co 43
Carlin Sons Co, Thos..... 43-66
Carroll-Porter Boil & Tank Co 51
Carson Trench Mach Co..... 84
Cement Age..... 33
Central Foundry Co..... 14
Central States Bridge Co..... 81
Champion Bridge Co..... 81
Chattanooga Car & Fdy Co..... 45
Chibas, Eduardo J..... 37
Chicago & Alton..... 5—
Chicago Con Machy Co..... 60
Chicago Blue Print Paper Co. 24
Chicago Bridge & Iron Works 10
Chicago House Wrecking Co.. 43
Chicago Port Cement Co..... —
Chicago Rail Tape Co..... 24
Chilton Paint Co..... 1
Churchill, P M..... 36
Cincinnati Equipment Co..... 45
City Wastes Disposal Co..... 36
Clark Pub Co, Myron C..... 52-53
Clark & Co, W J..... 47
Clarkson School of Tech..... 35
Classified Index..... †34e-h
Clayton Air Compressor Wks 22
Cleveland City Forge & Ir Co. 50
Cleveland Eng Agency..... 40
Climax Road Machine Co..... 7
Climax Shock Guard Co..... 45
Clinton Bridge & Iron Co..... *78
Clinton Wire Cloth Co..... 57
Clow, J B, & Sons..... 15
Coekburn Barrow & Mach Co. 30
Coffin Valve Co..... 15
Colby, J A..... 37
Coldwell-Wilcox Co..... 14-72
Cole Bros..... 72
Columbia Machine Works..... 8
Columbus Machine Co..... 4
Columbus Tent & Awning Co. 42
Conard, Thos F..... 45
Conard, Wm R..... 38
Concrete Steel & Tile Con Co 38
Concrete Steel Eng Co..... *66b
Conklin, O C..... 36
Consol Eng & Const Co..... 30
Consol Rosendale Cement Co. 84
Cont Car & Equip Co..... *46
Contractors' Plant Mfg Co.... 67
Cont Supply & Equip Co..... 56
Cook Well Co..... 17
Cooper, Theodore..... 36
Copley Cement Co..... 60
Cornell, J S & J M..... 38
Cowing, Eng Co..... 30
Crandall, Chas D..... 74
Crandall & Son Co, H H..... *52
Crane Co..... —
Creeson, Geo V, Co..... 72
Cridge, E L..... 36
Crocker-Wheeler Co..... 1
Crown Drilling Machine Co. *22
Crummer, F D, & Son Co..... 60
Cumming Filter Co..... 18
Curtin-Ruggles Co..... 76
Cussodis, A, Uhim Const Co. 7
Cutler Mfg Co..... 52
Cyclone Drilling Mach Co.... 22
Cyclopean Co, The..... 64
Cyclopean Iron Works..... 85
Dake Engine Co..... 63
Dalzell & Co..... 44
Dalzell Co, The..... 22
Darling Pump & Mfg Co..... 14
Davenport Loco Works.....43-47
Davidson, M T..... 7
Davis, G M..... *14
Davis, M E..... 45
Dawson Globe Iron Works..... 6
Dean Bros Steam Pump Wks 5
De Laval Steam Turbine Co. 9
Deming Co..... 9
Des Moines Bridge & Ir Wks. 11
d'Este, Julian Co..... 16-17
De Trampe, Adam..... 50
Detroit Graphite Mfg Co..... 50
Detroit Leather Sp'lty Co..... 50
Dickey, W S, Clay Mfg Co.... 1
Dietzgen, Eugene, Co..... 24
Dimmick Pipe Co..... 17
Dixon, Jos, Crucible Co..... *61
Dobbie Fdy & Mach Co..... 68
Dobbs, J M..... 46
Dobie Co, Abner..... 6
Dodge & Day..... 37
Dodge Coal Storage Co..... 62
Donaldson Iron Co..... 15
Downie Pump Co..... 5
Drake Standard Mach Works. 60
Dresser, S E..... 40
Drouve, G, Co..... 10
Drummond, M J, & Co..... 15
Duenkel, Chas H..... 36
Dunham, H F..... 36
Dunn Mfg Co..... †17
Duplex Fdry & Mach Co..... 52
Dupont Co..... *27
Du Vivier, C A..... 36
Eastern Construction Co..... 81
Eastern Equipment Co..... 43
East Ohio Sewer Pipe Co..... 1
Economy Drawing Table Co. *26
Edison Portland Cement Co. *73
Edson Mfg Co..... 28
Edwards & Co, Joseph..... 5
Electric Welding Mfg Co..... 77
Electro Dynamic Co..... 16
Electro Sun Blue Print Co..... 24
Elliott Machine Co..... 69
Elliott Co S K..... 26
Emerson Steam Pump Co..... 8
Emsen Pipe Foundry..... 23
Empire Portland Cement Co. 60
Engineering Agency, Chicago 40
Engineering Employment Bur 31
Epping-Carpenter Co..... 7
Eppinger & Russell Co..... 67
Erie Pump & Engine Co..... 9
Erie Machine Shops..... 37
Erie Railroad Co..... 43
Eureka Machine Co..... *59
Evans, Geo E..... 38
Evens & Howard Fire Brick .. 1
Excelsior Wooden Pipe Co..1, 14
Exp Metal & Corrug Bar Co .. *74
Fairbanks, Morse & Co..... 63
Fairchild & Gilchrist..... 37
Fanning, J T..... 36
Farley, M..... 37
Farrel Fdy & Mach Co..... 2
Farrington, Harvey..... 36
Favor, Ruhl & Co..... *36
Fayette Eng & Const Co..... 37
Federal Filtration System..... 34
Featherstone Fdy & Mach Co 70
Ferguson Contracting Co..... 30
Field, Wm P..... 36
Fielding, J S..... 36
Fisher Hyd Stone & Mchy Co 72-73
Fitz-Hugh, Luther Co..... 50a
Flad, Edward..... 36
Flaesher, E J..... 37
Flory, S, Mfg Co..... 62
Ford, Owen..... 36
Fort Pitt Bridge Works..... 61
Fort Wayne Electric Works.. 16
FOR SALE..... 40 to 48
Foster Co, L B..... 15
Foster Engineering Co..... *58
Foundation Co..... 33
Fox, John, & Co..... 15
Fredenburg & Lounsbury..... 64
French, Samuel H & Co..... 60
Friestedt Inter Chan Bar Co.. 2
Fuertado, R S..... 36
Fuertes, James H..... 36
Fuller, Frank L..... 36
Fuller, Geo W..... 36
Fuller, H W..... 37
Gabriel Con Steel Co..... 77
Gandy Belting Co..... 64
Gardner, L H..... 36
Gayler, O..... 36
Genasco Roofing Co..... *56
General Electric Co..... 16
General Fireproofing Co..... 74
General Pneumatic Tool Co... 21
Gest, G M..... 30
Gilbreth, F B..... *72-73
Gillespie, T A, Co..... 51
Girard, J B..... 36
Gleason Mfg Co..... 77
Good Roads Machinery Co.... 71
Goubert Mfg Co..... 10
Goulds Mfg Co..... 5
Granger Co, A D..... 18
Gravel Tank Works..... 10
Gray, Samuel M..... 37
Green Fuel Economizer Co.... 12
Greer Filter Co..... 53
Griot, Gustav..... †28
Gulfport Creosoting Co..... 67
Gunn, Richards & Co..... †54
Gurley, W & L E..... 25
Hammond Iron Works..... 10
Hanna Eng Works..... 30
Hanna Mfg Co..... 24
Hapgood's Bureau..... 41
Hardison-Walker Retrac. Co 58
Hardtmuth & Co, L O..... 25
Harper Machinery Co..... 41
Harrison Safety Boiler Works 51
Hart, Chas..... 35
Hartranft, Wm G, Cement Co 84
Harvard University..... 36
Haskin, Q A..... 36
Hatton, T Chalkley..... 36
Hawes, L E..... 36
Hays, John W..... 37
Hayward Co, The..... 65
Hazen, Allen..... 36
Heidelberg Cement Co..... *78
Heller & Brightly..... 24
Helwig Mfg Co..... *2a
Hennebique Const Co..... *73
Hering, Rudolph..... 36
Herring Mfg Co..... 18
Hewitt-Carstaphen Co..... 36
Hildenbrand, W..... *38
Hildreth & Co..... 37
Hill Machine Co..... 5
Hill, Wm E..... 37
Hill & Irvine..... 37
Hines & Jones..... 30
Hitner, H & Sons..... 44
Hocking Valley R R..... 20
Hodge Boiler Works..... 11
Hoisting Machinery Co..... 64
Holman, D F..... 46
Holmes, A L..... 30
Howard Co, E..... 37
Hudson Eng & Const Co..... 30
Hunt, C W, Co..... 57
Hunt, Robert W, & Co..... 38
Huston, R C..... 36
Hyde Bros & Co..... 45
Hydrex Felt & Eng Co..... 5
Illinois Central R. R..... *34f
Indianapolis Switch & Frog Co 46
Industrial Works..... 68
Ingersoll-Rand Co..... 21
Inland Steel Co..... 77
Internat Asheson Graph Co.. 2
Internat Correspondence School..... †41
Internat Treeo & Const Co.. 67
Internat Fence & Fireproof Co..... 46
International Steam Pump.... 12
Interstate Engineering Co.... 19
Iowa Engineering Co..... 36
Iowa State College..... 35
Iroquois Iron Works..... 26
Italian Labor Infor Bur Office. 41
Jackson, John H..... * 23
Jansen, Steinmann & Co..... 30
Jeanesville Iron Works Co.. *16
Jeffrey Mfg Co..... 64
Jewell, Wm M..... 36
Jobson, Hooker Co..... 81
Johns-Manville Co..... 6
Johnson, E P..... 17
Johnson, Walter G..... 37
Jones & Gatchell..... 36
Joyce, Cridland Co..... 52
Julian Bros..... 41
Just, G A..... 37
Kalamazoo Fdry & Mach Co.. 30
Keeler, E Co..... 19
Kelley Is Lime & Trans Co.. 1
Kelly-Springfield Rd Rol Co.. 3
Kennedy, Julian..... 37
Kennedy Valve Mfg Co..... 19
Kennicot Water Softener Co.. 10
Kenwood Bridge Co..... 80
Kent Mill Co..... 71
Kenffel & Esser Co..... 35
Keystone Blue Paper Co..... 24
Keystone Driller Co..... 20-59
Keystone Powder Mfg Co..... 17
King Bridge Co..... 80
King Lawson Car Co..... 47
Kingsford Fdy & Mach Wks.. 7
Kinnear Mfg Co..... 50
Kitson Hydro-Carbon Ldg Co 17
Knight & Hopkins..... 37
Kobert, B Co..... 25
Koppel, Arthur Co..... 66
Kosmos Port Cement Co..... 60
Kratzer, W N, & Co..... 76
Kreuger, Ivar..... 37
Kuppenis, J C..... 14
Kurtz, Langbein & Swarts .. 38
Lacledo Fire Brick Mfg Co.. 27
Ladd, E B..... 73
Laidlaw-Dunn-Gordon Co..... 20
Lake Erie Eng Works..... *27
Lambert Hoisting Engine Co. 63
Lathbury, B B..... 37
Lawrence Cement Co..... 84
Lawrence Pump & Engine Co 8
Lawrence, W J..... 37
Le Clare, Francis..... 38
Ledder, G G..... 38
Ladoo, Jas, & Co..... 8
Lehigh Car Wheel & Axle Wks 72
Lehigh Engineering Co..... 36
Lehigh Portland Cement Co.. 1
Lehigh University..... 35
Lehigh Valley Test Lab..... 38
Leopold, J, & Co..... 46
Leschen, A, & Sons Rope Co *61
Levering & Garrigues Co..... 81
Lewis Institute..... 35
Lewis & Kitchen..... *28
Lidgerwood Mfg Co..... 62
Lietz, A, Co..... 24
Lima Loco & Mach Works.... 47
Link Belt Co..... 64
Link Chain Belt Co..... 64
Lino Paint Mfg Co..... 59a
Lock-Joint Pipe Co..... 23
Loco & Mach Co of Mont..... 82
Lombard Governor Co..... 69
Long Island R R..... 43
Longnecker, Chas, & Co..... 27
Loomis-Manning Filter Co.... 1
Lucius, Albert..... 37
Ludlow, J L..... 37
Ludowici Celadon Co..... 76
Lufkin Rule Co..... 24
Lunkenheimer Co..... 14
Luther, J F, Glove Co..... *28
Luzerne Eng Co..... 37
Lynn Filter Mfg Co..... 53
Mack Mfg Co..... 27
Macomb Sewer Pipe Co..... 1
Mann & Co..... 36
Main Belting Co..... 64
Maine Co, The..... 41
Marine Eng & Mach Co..... 8
Marion Steam Shovel Co..... 69
Marks, Wm D..... 37
Marquette Port Cement Co.... 84
Marvin Electric Drill Co..... 22
Mason, W P..... 37
Massillon Iron & Steel Co..... 77
Maurer, Henry, & Son..... 39
Maury, Dabney H..... 36
Maxcy, J W..... 37
Mayer, Joseph..... 37
McAuley, J A, Tent & Awn Co 42
McAvoy Vitrified Brick Co.... 71
McClintic-Marshall Const Co. 80
McConway & Torley Co..... 48
McCord, J B..... 37
McGowan, John H, Co..... 7
McKelvey Concrete Mach Co 60
McKenna, Dr Chas..... 51
McKernan Drill Co..... 22
McLean, John..... 18
McMullan, Arthur, & Co..... 38
McMyler Mfg Co..... 68
McNeil, James, & Bro..... 15
McWane Pipe Works..... 12
Meacham, Allen..... 36
Meacham & Wright..... 36
Mead-Morrison Mfg..... 64
Mechanical Mfg Co..... 46
Meehan Boiler & Const Co.... 11
Mensch, L J..... *73
Meredith Cedar Co, J P..... 46
Merrill Bros..... 80
Merriman & Hudson..... 37
Metallurgical Laboratory 38
Mietz & Weiss..... 10
Michigan College of Mines.... 35
Millar, Chas, & Son Co..... 51
Miller & Co, H C..... *74
Milne Mfg Co..... †23
Milwaukee Bridge Co..... 81
Minneapolis Steel & Mchy Co* 78
Mississippi Wire Glass Co.... 50
Mo Valley Bridge & Iron Co.. 80
Modern Tool Co..... *17
Monmouth Mining & Mfg Co.. 1
Monolith Steel Co..... 77
Monongahela Mfg Co..... *24
Moore, V B..... 36
Moore, L C..... 37
Morava Construction Co..... 79
Morris Co, I P..... 14
Morris Machine Works..... 7
Morse, A J, & Son..... 70
Morse, F..... 37
Motley Green & Co..... 48
Mount Vernon Bridge Co..... 79
Mundy, J S..... 62
Municipal Eng & Con Co....58, 59
Murray Co..... 52

Nat Boiler & Sheet Iron Wks 11
National Fireproofing Co..... 2
National Hoisting Eng Co.... 64
National Meter Co..... 19
National Paint Works..... 1
National Powder Co..... *54
National Wood Pipe Co..... 14
Naughton Co..... 30
Neptune Meter Co..... *17
Newhall, J B..... 37
New England Steam Brick Co 37
New England Structural Co... 81
New Era Gas Engine Co..... 10
N J Central..... 53
N J Foundry & Machine Co.. †64
New Orleans Wood Pres Wks 67
N Y Blower Co..... 13
N Y Central..... 46
N Y Cont Jewell Filtration Co 84
N Y Engineering Agency..... 40
N Y Lead Wool Co..... 8-17-18
N Y Purchasing Agency..... 37
N Y Sewage Disp Co..... 37
N Y Switch & Crossing Co... 58a
N Y Univ Sch of App Science 35
Niagara Tach & Inst Co..... 84
Nortolk Creosoting Co..... 67
North Am Dredging Co..... 70
North American Metalline Co. 49
North Penn Iron Co..... 68b
Norwalk Iron Works Co..... 32
Norwich University..... 35
Norwood Engineering Co..... 14
Ohio Northern University.... 35
Olds Gas Power Co..... *17
Oliver Mfg Co..... 46
Olmsted, A H, Eng Co..... 37
Orford Copper Co..... 31
O'Rourke Eng & Const Co..... 30
Osgood Dredge Co..... 69
Osborn, John M..... 37
Oswego Boiler & Engine Co.. 12
Otto Gas Engine Works...*10-11
Owen, James..... 36
Pacific Flush Tank Co..... 51
Page & Shnable..... 62
Palmer, Fay B..... 52
Parker Boiler Co..... 10
Peasant Steel Co..... 31
Pehnerson, W W..... 79
Pawling & Harnischfeger.... 63
Pels & Co, Henry..... 78
Pelton Water Wheel Co..... 8
Penn-Allen Cement Co..... 60
Penn Bridge Co..... 80
Pennsylvania Cement Co..... 84
Pennsylvania Eng Works..... 5
Penn Military College..... 35
Pennsylvania Steel Co..... 80
Pentiarge, Th..... 28
Petroleum Iron Works Co.... 13
Pettyjohn Co..... 44-79
Pfister Harm..... 36
Phillips & Worthington..... *28
Phoenix Bridge Co..... 81
Pickett, H W..... 45
Pierce, Geo N, Co..... †29
Pierson, Geo S..... 36
Pittometer Co..... 18
Pittsburg Meter Mfg Co..... 53
Pittsburgh Ind Iron Wks..63-66
Pittsburgh Instru & Mach Co 25
Pittsburgh Mfg Co..... 17
Pittsburg Meter Co..... 1a
Pittsburg Pipe & Iron Co..... 44
Pittsburg Rading & Rivet Co. 79
Pittsburg Testing Lab Co..... 50
Pittsburg Steel Co..... 46
Pittsburgh Test Lab Ltd..... 37
Platt Iron Works..... 9
Poole Eng & Machine Co..... 9
Porter, H K, Co..... 47
Porter, J C..... 37
Post Pipe Co..... —
Power & Mining Mach Co..... 71
Power Specialty Co..... 6
Prescott, F M, St'm Pump Co 5
Pressed Steel Car Co..... 48
Pressey & Weller..... 36
Pipes, M..... *24
PROPOSALS, 31-37, Supplement
Puget Sound Bdge & Dreag Co 68
Puget Sound Timber Pres Co 67
Pulsometer Steam Pump Co 1, 8
Purington Paving Brick Co.. 27
Putman, H J, & Co..... 28
Queen & Co..... 39
Rail Joint Co, The..... 28
Railroad Supply Co..... *47
Railway Steel-Spring Co..... 1
Ramapo Iron Works..... 45
Randolph, L S..... 37
Ransome Concrete Mach Co... 64
Raymond Bros. Imp Pulv Co 74
Raymond Con Pile Co..... —
Raymond Int'l Inc..... 8b
Reeves Brothers Co..... 11
Reid-Turnbull Con Co..... 77
Reinforced Con Pipe Co..... †38
Rensselaer Polytechnic Inst.. 30
Republic Gov Works..... 12
Reuter, Carl H..... 29
Revolute Mach Co..... 28
Richardson & Co..... *45
Richardson Scale Co..... *54a
Rienie Bros Test & Mach Co.. 11
Riggs & Sherman Co..... 37
Rinaldi Bros..... 1
Rinker-Almond Turbine Co.... 4
Risdon Iron Works..... 68b
Riter-Conley Mfg Co..... 11
Riverside Bridge Co..... 81
Roberts Mfg Co..... 53
Robins Conveying Belt Co .. 61
Robinson, A W..... 37
Robinson & Orr..... 45
Rock Island..... 43
Rockwood Mfg Co..... 58
Rodger Ballast Car Co..... 74
Roeping Construction Co..... 56
Roebling, John A, Sons Co.... 63
Rondinella, L F..... *29
Rose Polytechnic Institute.... 39
Rose Valve Co..... 15
Roth Mfg Co..... 18
Rourke, A G, & Co..... *34
Ruggles-Coles Eng Co..... 60
Russell, S Sent..... 36
Russell Wheel & Foundry Co.*50a

Safety Car Heat & Light Co... 45
Salmond Bros..... 30
Sampson Co, Geo H..... 39
Sanderson & Porter..... 37
Sanitary Fort Cement Co..... 58
San Francisco Bridge Co.... 86a
San Francisco Tim Pres Co.. 86a
Saunders', D, Sons..... 10
Saxton, J O..... 41
Scaife, Wm B, & Sons Co..... 79
Scherzer Roll Lift Bridge Co.. 74
Schnell, Julian, & Co..... 26
School of Structural Drafting 40
Schrader's Son, A..... 70
Scientific, L, & Sons Co..... 81
Scowcroft, Kirk & Co..... 28
Scott Mfg Co..... *74
Sessions Foundry Co..... 30
Shanahan, D E, & Bro..... 36
Shannon, Jacob, & Co..... †46
Sharon Boiler Works..... 17
Shaymut Brick Works..... 27
Sheffield School of Yale..... 35
Shepherd Engineering Co..... 10
Shoemaker, Louis F, & Co.... 80
Sicilian Asphalt Paving Co... 1
Simplex Conc Mach Co..... 12
Simplex Concrete Piling Co.... 5
Simpson Bros Corporation.... 79
SITUATIONS WANTED..40-42
Slade, Arthur J..... 37
Smidth, F L, & Co..... 69
Smith & Sons Co, Theo..... 70
Smith, Anthony F, Mfg Co.... 19
Smith & Davis..... 37
Smith & Co, Edward..... 50d
Smith, S Morgan Co..... 9
Smart & Triest..... 30
Snow, T W (Otto Gas Eng).... 4
Snyder, Hiram & Co..... 34
Solomon-Norcross Co..... 36
Soltzman, S G..... 34
Sooysmith, Charles..... 37
Sorge, Geo A..... 37
Souther, Jas & Co..... *36b
Southwark Fdy & Mach Co.. *14
Southern Creosoting Co..... 67
Southern Iron & Equip Co.... 44
Spackman Engineering Co.... 38
Spencer, L Bernard..... 37
Sprague Electric Co..... 62
Springfield Boiler & Mfg Co.. 12
Springfield Gas Engine Co.... 10
St George H V..... *34
Stackpole & Brother..... 26
Standard Bridge Co..... 81
Standard Paint Co..... 60
Standard Roller Bearing Co... 2
Star Drilling Machine Co..... 20
Stark Fdy Bell Co..... 32
State College of Kentucky.... 35
State University of Iowa..... 35
Steel Storage & Elev Con Co.. 78
Sterling Wheelbarrow Co..... 71
Steward & Mcnaime Mfg Co... 52
St Louis Portland Cement Co 60
Stone & Webster..... 30
Stothoff Brothers..... 30
Stough, H B..... *25
Stow Flexible Shaft Co..... 30
Stow Mfg Co..... 22
Strain, J H Co..... 37
Straley & Hasbrouck..... *34
Streeter, H A..... 79
Strobel Steel Const Co..... 80
Stroudsburg Eng Works..... 63
Structural Concrete Co..... 77
Struthers Wells Co..... 13
Stuebner Iron Works..... 85
Stubb Bros Bdg & Iron Co.... 81
Stump-Reudenbaugh & Packard 51
Sturtevant, B F Co..... 7
Sturtevant Mill Co..... 71
Sullivan Machinery Co..... 22
Surveyors Inst Exchange..... 24
Swenson, Emil..... 37
Swinburne & Clark..... 37
Syracuse Chilled Plow Co ... *38

Taylor Iron & Steel Co..... 83
Technical Literature..... 31
Thayer, W G..... 36
Thew Automatic Shovel Co.. 69
Thompson & Sons Mfg Co.... 10
Thomson, T Kennard..... 37
Thomson Meter Co..... 18
Tidden Cement Co..... 74
Tippets & Wood..... 11
Toch Bros..... 78
Tod, Wm Co..... 8
Toledo Foundry & Mach Co.. 70
Toledo-Massillon Bridge Co.. 81
Tomkins Calvin..... 47
Toomey Bros..... 38
Torbert, A C, & Co..... 44
Traylor Engineering Co..... 84
Trenton Iron Co..... 85
Tribus & Massa..... 37
Troy Public Works Co..... 45
Troy Wagon Works Co..... 55
Trussedall, W S..... 37
Trussed Concrete Steel Co.... 75
Tucker, B W..... 37
Tucker & Vinton, Inc..... 82-19
Turbo College..... 35
Turner, C A F..... 38
Turner Construction Co..... 77

Ulmer, J C, & Co..... 37
Underwood Typewriter Co.... 32
Underwriters Eng & Con Co.. 79
Union Hydraulic Works..... *14
Union Iron Works..... 65
Union Switch & Signal Co.. †39
Unit Con. Steel Frame Co.... 8
United Eng & Con Co..... 30
United Telpherage Dept..... 62
Universal Drafting Mach Co.. 24
Universal Port Cement Co .. 84
University of Illinois..... 35
University of Michigan..... 35
University of Vermont..... 35
University of Virginia..... 35
University of Wisconsin..... 35
U S Cast Iron Pipe & Fdy Co 15
U S Drying Engineering Co.. *60
U S Mineral Wool Co..... 1
U S Steel Piling Co..... 4
U S Wind Engine & Pump Co 13
U S Wood Preserving Co.... * 54
Utah State School of Mines.. 35
Utica Pipe Foundry Co..... 51

Valls & Young..... 79
Van Wie Pump Co..... 5
Vulcan Iron Works Co..... 81
Virginal Bridge & Iron Co.... 81
Vulcan Iron Wk (Chicago).... 69
Vulcan Iron Wks Co (Toledo) 69
Vulcan Ir Wks (Wilkesb'e) 47-72
Vulcanite Port Cement Co.... 84

Wagenhorst, J H..... 25
Walker, S D..... 37
Wallace-Coates Eng Co..... 30
Wall St Summary..... 73
Want Cards and Site Open..40-42
Waring, Chapman & Farquhar 37
Warner, Chas, Co..... 60
Warren City Boiler Works.... 10
Washington School of Eng.... 35
Washington University..... 35
Waterman, L E, Co..... 45
Waterproofing Co, The..... *33
Watertown Engine Co..... 17
Waterworks Equipment Co .. 1
Watkins, Thos..... †17
Watson, Benjamin..42-43-44-45
Watson-Stillman Co..... 50
Watson Wagon Co..... 53
Weber, F, & Co..... *28
Weber Steel Con Chimney Co 9
Webster Engineering Co..... 37
Webster Mfg Co..... 64
Wehrman Machine Works..... 18
Weir Frog Co..... 48
Wellman-Seaver-Morg Eng Co 62
Wells Light Mfg Co..... 1-4
Westcott Co, G F..... 34
Western Cement Co..... 60
Western Wheel Scraper Co.. 45-52
Westinghouse Air Brake Co.. 83
Westinghouse Elec & Mfg Co.. 83
Weston, E B..... 37
West Pascagoula Creo Wks.. 67
Whelan, J A..... 37
White Co, J G..... 34-†37
Whitney, O R..... 44
Wickes Bros..... 43
Wiedenbach, O F..... 38
Wiener, Ernst..... 46
Wight, W N, & Co..... 75
Wilcox Co, W H..... 59
Wiley, John, & Sons..... 80
Wilkins Eng Co, Wm G..... 37
Williams, Brown & Earle †-24-26
Williams Bros..... *2a
Williams Electric Mach Co.. 16
Williams, Proctor & Potts.... 37
Williamson Bros Co..... 63b
Williamsport Wire Rope Co.. 61
Wilson, Harris & Richards.... 37
Wilson, J G Mfg Co..... 50
Wisconsin Bridge & Iron Co.. 8
Wise & Watson..... 37
Wittstock, F & R..... 75
Wonham-Magor Eng Co,... 45, 63
Wood Drill Wks..... 24
Wood, R D, & Co..... 17
Woodruff, Geo S..... 44-45
Worcester Polytechnic Inst.. 35
Worthington, Henry R..... 69
Wrigley Pipe & Creo Co..... 67
Wynkoop Wood Pipe Co..... 14
Wyoming Shovel Co..... 31

Yale & Towne Mfg Co..... 64
Yale University..... 35
York Bridge Co..... 81
Young, W W..... 1
Young & Sons Co, John..... 42
Youngstown Bridge Co..... 46
Youngstown Ir & St Roof Co.. 79

AGENCIES or BUREAUS
5 cents a word.

The School of Structural Drafting

A course of instruction in the actual office work of designing, estimating and making shop drawings for Structural Steel Work.
Given by Mail Only
For information address, P. O. Box, 2122, BOSTON, MASS.

THE BEST WAY

to get a Good Position in Drafting or Engineering is to file an application direct with some of our clients who are depending on us to get competent and experienced applicants for their Vacant Positions. Send stamp for blank and List of Vacant Positions.
CLEVELAND ENGINEERING AGENCY, Rose Bldg., Cleveland, Ohio.

HOW ARE WE

to know that you are in the market, or even contemplating a change of position, if you do not send us the facts in your particular case. Let us have the above and see what we can do for you.
THE NEW YORK ENGINEERING AGENCY,
Tel. 7448 Cort'dt. 35 Warren St., N. Y.

"At it successfully since 1890"
Headquarters for
ENGINEERING HELP
The Engineering Employment Bureau
SYRACUSE, N. Y.
If you want a man or a position, be sure to communicate with us

SUPERINTENDENT: Excellent opening for man with experience on large contract work who has handled at least 2,500 men. Must have good practical experience on general construction work, particularly in hydro-electric work. A man of technical education combined with strong business ability and plenty of initiative will be given the preference. Salary to be arranged.
SUPERINTENDENT: Construction company wants man thoroughly acquainted with plans and experienced on concrete work. Should be young man who can do some drafting. Salary, $1,200-$1,500.

Hapgoods
305 Broadway, New York.

SITUATIONS WANTED

Cards under this head are inserted in uniform style, in solid type, at 1½ cents a word; single-leaded, 2 cents a word; double-leaded, 2½ cents a word (address to be counted in every case). Special arrangement of matter, $1.50 an inch. Cash MUST accompany the order in all cases.

Mechanical and Electrical Engineers.

COMPETENT mechanical engineer desires change; 10 years' experience in design, construction, operation of power plants, steam, hydraulic, electric, hoisting machinery, general engineering. Address "D. A. 15," Engineering News, New York. 15-12t

MECHANICAL college education, 5 years' experience at manufacturing plant construction, structural steel and bridge shop operations, and manufacturing plant operation, desires connection with manufacturing plan ; Middle West preferred. Address "' . A. 16," Engineering News, New York. 16-12t

GRADUATE MECHANICAL and electrical engineer seeks position with chance of advancement. Seven years experience. Address "R. 24," Engineering News, New York. 24-3t

MECHANICAL ENGINER (32), technical education (Univ. of Penna.) open for engagement. Ten years' shop and public service corporation. Very energetic, resourceful and an organizer. First-class business and executive ability. Would also consider private secretaryship. Location Philadelphia. Address "P. 19," Engineering News, New York. 24-6t

TECHNICAL GRADUATE in electrical engineering; two years' experience general and power plant construction; inspection, surveying, locating and handling contracts; wishes to change position. Address "O. A. 21," Engineering News, New York. 24-5t

MECHANICAL ENGINEER (28), technical graduate, Associate American Society Mechanical Engineers, six years' general experience design, construction, inspection, operation, large plants. Address "M. A. 25," Engineering News, New York. 25-12t

WORK SOLICITED by two mechanical and mining engineers on Pacific Coast, designing and detailing of conveying and elevating machinery, coal handling plants, structural work, steel and reinforced concrete. Address "E. P.," 217 Madison St., Seattle, Wash. 25-4t

POSITION wanted by young M. E. technical graduate; 4 years' experience. Address "X. A. 16," Engineering News, New York. 16-12t

Civil Engineers.

CIVIL ENGINEER or superintendent (30), technical graduate, eight years' experience in office work, drafting, surveys, pile-driving, pipe-laying, testing cement and sand, and in construction of brick buildings, earthwork, concrete and stone masonry, macadam roads, and cement walks. At present in charge of important construction work. Address "P. A. 21," Engineering News, New York. 21-6t

CIVIL ENGINEER—Technical graduate, 22 years' experience as assistant and chief engineer, railway location and construction, desires position as chief engineer. Expert at railroad location; excellent references. Address "E. 18," Engineering News, New York. 22-12t

CIVIL ENGINEER, technical graduate, 3 years 'experience, construction and maintenance of way; good field and office man, capable of taking charge of work, and at present employed, desires position on railroad location, construction or maintenance of way. Excellent references. Location immaterial. Address "X. 24," Engineering News, New York. 24-4t

POSITION WANTED by graduate civil engineer; age 25; at present resident engineer on electric road construction. Am experienced in all branches of field engineering and can take charge. Have experience in reinforced concrete construction. Prefer position with large contracting firm, or on railroad construction. References furnished. Salary desired, $100. Address "O. 24," Engineering News, New York. 24-3t

A GRADUATE ENGINEER, Associate Mem. A. S. C. E., desires position as assistant engineer with railroad; has had considerable experience in executive and office work; can give satisfactory references. Address "B. A. 24," Engineering News, New York. 24-3t

CIVIL ENGINEER, technical graduate, five years' experience, bridge erection, waterworks, office work and surveys; three years on factory construction, steel and reinforced concrete, amounting to one million dollars; fair draftsman, good at instrument work, setting templates or machinery; desires position on construction, preferably with industrial plant or along concrete lines. Address J. G., 1359 Mass. Ave. S. E., Washington, D. C. 24-6t

EXPERIENCED structural steel designer desires to make change. Address "Z. 25," Engineering News, New York. 25-6t

EXPERIENCED reinforced concrete engineer desires to make a change. Address "X. 25," Engineering News, New York. 25-6t

TECHNICAL GRADUATE, age 30, 8 years' experience in bridge and railroad work, both office and field, desires change. Capable of making track layouts, and designing masonry and all classes of railroad and highway bridges. Rapid and accurate worker. Excellent references. Desires position as assistant engineer, office or field, with engineer of bridges, construction, or maintenance of way. Address "E. 25," Engineering News, New York. 25-6t

LOCATING ENGINEER, experienced in roughest location and construction, East, West and in Mexico, desires offer for 1907; thoroughly capable man. Address "E. 26," Engineering News, New York. 26-1t

CIVIL ENGINEER, graduate, 1904, would like change of position, New York City or vicinity preferred; two years' experience, railway preliminary and location, triangulation and general work. References. Address "F. 26," Engineering News, New York. 26-6t

TECHNICAL GRADUATE, experienced in concrete and railroad construction, desires position in Southwest, particularly Mexico, Arizona or California; now employed on big improvement in New York City. Best references. Address "H. 26," Engineering News, New York. 26-2t

CIVIL ENGINEER, M. Am. Soc. C. E., technical graduate, 16 years' experience in design and construction of steam and electric railway and power-house work, bridges, buildings, foundations, docks, water supply and municipal work, and of reinforced concrete for office buildings, warehouses and factories, desires responsible position with company, contractor or architect. Open January first. Address "L. 26," Engineering News, New York. 26-3t

POSITION AS
Engineer of Company Forces
with Railroad Company, at present Superintendent of Construction large Eastern Railroad. At liberty Jan. 1st. Address "W. 26," Engineering News, New York. 26-1t

CIVIL ENGINEER desires to interest himself with engineering firm or contractors, where he can earn $150 per month salary; 22 years' experience, railroad and water work; would invest $5,000 on good proposition. Address "S. 26," Engineering News, New York. 26-2t

WANTED—Position as resident engineer on railroad construction; six years' experience. J. G. F., 4922 Forest Park Blvd., St. Louis, Mo. 26-7t

Bridge and Structural Engineers.

WELL-KNOWN structural engineer wants more work; designing, detailing, stair and ornamental work and mechanical equipment of buildings. Address "F. 16," Engineering News, New York. 17-12t

BRIDGE and structural engineer with twelve years' experience in the design of railway and highway bridges, mill buildings, power plants, etc., wishes to change position. Address "M. 23," Engineering News, New York. 23-4t

EXPERIENCED ENGINEER in Minneapolis would like work designing structural steel and reinforced concrete buildings or bridges; also would advise about any other work you may have. Address "G. 23," Engineering News, New York. 23-5t

BRIDGE AND STRUCTURAL ENGINEER, good business and executive abilities, capable systematizer, wants responsible executive situation east of Chicago. Will accept a moderate salary at start. Address "Z. A. 22," Engineering News, New York. 24-3t

Surveyors.

YOUNG MAN desires position as Assistant Engineer or Transitman. Five years' experience on construction work. Well recommended. Address "X. A. 24," Engineering News, New York. 24-3t

YOUNG MAN desires change. 4½ years experience as topographer, transitman and levelman. Good reference. Address "L. A. 25," Engineering News, New York. 25-6t

TRANSITMAN (24) wants position at once; 8 years' experience in railroad work; go anywhere. Address "G. 26," Engineering News, New York. 26-1t

Draftsmen.

MECHANICAL DRAFTSMAN is open for engagement; 14 years' experience on heavy machinery, extension, improvements and maintenance of plant, steel wood and concrete construction, general engineering work. Address "E. 20," Engineering News, New York. 24-4t

PRIVATE WORK solicited by civil engineer and draftsman; designing, detailing, structural work for buildings, computing, estimating; also timber and masonry structures. Address "A. 21," Engineering News, New York. 24-14t

Superintendents, Misc., etc.

MASTER MECHANIC of railroad, contracting, power, mill or manufacturing plant, varied experience erecting and maintaining high-grade machinery and accessories, age 36, desires change. Address "D. 20," Engineering News, New York. 20-12t

SUPERINTENDENT OF CONSTRUCTION—Engineer, experienced in blast furnace, coke oven and steel plant construction and railroad construction and maintenance, open for engagement January 1; can refer to present employers. Address "K. 23," Engineering News, New York. 23-12t

SUPERINTENDENT (38), technical education, eighteen years practical experience on heavy masonry, concrete, steam shovel, tunnel, tunnel lining, use of all kinds steam and compressed air machinery, and handling of large forces of men; at present in charge of important work; desires change. Best references. Address "B. 24," Engineering News, New York. 24-3t

YOUNG ENGINEER, has had broad experience designing hydro-electric plants, open for position. Address ENGINEER, Room 1710, Twenty Broad St., New York. 25-12t

TECHNICAL GRADUATE (25), desires to engage in sewerage, water supply, or concrete work. Address "O. 25," Engineering News, New York. 25-3t

WANTED, POSITION.—Engineer, contractors' superintendent; eight years' experience masonry concrete, fireproof buildings, docks, railroad work, estimating. Address "R. 25," Engineering News, New York. 25-3t

SUCCESSFUL general manager; practical estimator; expert accountant; age 35; broad business experience; permanently employed; desires association with good company where efficient and honest service would be appreciated. Salary or partnership. Address "K. A. 20," Engineering News, New York. 25-4t

A1 REINFORCED concrete grading foundation foreman desires position, California or anywhere. Address "S. 25," Engineering News, New York. 25-4t

FORMER CHIEF ENGINEER of large coal company in Western Penna. and Associate Member A. S. C. E., desires position as **Chief Engineer or General** Supt. with reliable coal company. Perfectly familiar with planning projections and improvements and the cost of operation. Best of references. Address "C. A. 25," Engineering News, New York. 24-3t

NEW YORK contracting engineer wishes to represent structural steel concern on a commission basis. Address ROOM 250, 29 Broadway. 25-3t

CONCRETE CONSTRUCTION. Engineer familiar with construction wishes to go South or Pacific Coast. Would prefer to be engineer and foreman for contractor. References. Address "E. B. Engineering News, New York. 24-10t

RAILROAD, Self Made Engineer, thirty years old, ten years' experience railroad construction, at present superintendent of construction on large Eastern railroad. At liberty Jan. 1. South or Southwest preferred. Address "X. 26," Engineering News, New York. 26-1t

COAL MINE MANAGER—Competent engineer and manager, technical training, wide experience, now employed, prefers change. Age 30. Address "B. 26," Engineering News, New York. 26-2t

ALL-AROUND MAN on contracting work, inside and out; 15 years' experience, wants position. Address "O. A. 25," Engineering News, New York. 26-1t

FOR ADDITIONAL
"SITUATION WANTED"
ADVERTISEMENTS
See Construction News page 224.

SITUATIONS OPEN (or Vacant)

Rates 3 cents a word a time, set solid; 4 cents single leaded; 4½ cents double leaded; display $1.50 an inch. Miscellaneous wants are the same rate. Copy for Classified Advertisements may be left at any office of the American District Telegraph Co., New York City.

WANTED.—Drill runners on two-year rock tunnel job. THE PARKER-WASHINGTON CO., 1012 Chamber of Commerce, Chicago. 16-tf

WANTED.—Map draftsman. Send sample of work, state age, experience and least salary considered. Chief Engineer, THE CONSOLIDATION COAL CO., Frostburg, Md. 23-4t

WANTED—Computers and draftsmen on steam and street railway special track work. State age, experience and salary wanted. Address PENNSYLVANIA STEEL CO., FROG & SWITCH DEPT., Steelton, Pa. 24-3t

A THOROUGHLY competent engineer with experience in building of cement plants will be wanted in January to assist in construction work. Applicants will please state experience and salary desired. Good references required. A. A. P. C. W., Alsen, Greene County, N. Y. 22-2t

WANTED—At once, by large bituminous mining company in West Virginia, two mining engineers for office and mine work; position permanent; applicant to state experience and send sample of drafting and salary expected. Address "H. 25," Engineering News, New York. 25-3t

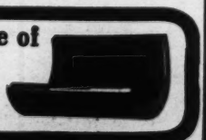
DESIGNING DRAFTSMAN wanted at metallurgical works near New York. Address "I. 25," Engineering News, New York. 25-2t

WANTED—At a bridge and structural plant in New England, several structural draftsmen. None but American technical graduates need apply. Address "A. 25," Engineering News, New York. 25-2t

WANTED—Young man of technical training as assistant engineer in large pumping station (Middle West); must be familiar with boilers and general steam engineering and willing to begin at moderate salary. An excellent opportunity for the right man. State in detail, age, training, experience and references. Address "C. 25," Engineering News, New York. 25-2t

WANTED—Young man with three or four years' experience in running transit level. Applicants must state salary desired and when prepared to commence work. Apply A. A. P. C. W., Alsen, Greene Co., N. Y. 25-2t

CLEANLINESS is a Great Feature of METALINE BEARINGS
Write to us and we will tell you all about others
NORTH AMERICAN METALINE CO.
6 West Avenue, LONG ISLAND CITY, N. Y.



WANTED
Technical Men Everywhere
in spare time. No goods to sell. No expense. Professors, engineers, literary machinists, draftsmen, etc., thus far appointed. State experience. Address "S. 20," c/o Engineering News, New York. 20-tf

WANTED—First-class experienced detailers, checkers, designers and estimators on structural steel work for bridges and buildings. Also contracting manager for sales department; one who has handled Southwest territory preferred. Also superintendent of erection who can handle general office correspondence as well as ten to fifteen field forces. Men with technical education preferred. Positions are permanent and offer excellent opportunity for advancement. State age, education, experience fully, salary and earliest date you can report, or no attention will be accorded. BARTLETT STEEL COMPANY, Joplin, Missouri. 25-tf

WANTED—Houston, Texas.—Assistant Engineer who can carry out assignments with general instructions. Work will range between railroad and municipal work, including masonry, concrete, drainage and general location. No letters of recommendation wanted. Applicant takes his own chances of giving satisfaction. Address "G. 25," Engineering News, New York. 25-tf

WANTED—Four structural draftsmen. State experience, salary expected. References requested. Address "W. 24," Engineering News, New York. 26-2t

WANTED—Structural draftsmen to make shop details of steel building construction. WEISKOPF & STERN, 68 William St., N. Y. 26-1t

WANTED—The address of an engineer or practical man familiar with the making of liquefied sulphurous acid with view to engagement. Write SIMPLEX CONCRETE PILING CO., 3400 Disston St., Tacony, Philadelphia, Pa. 26-1t

DRAFTSMAN WANTED—One experienced checker on structural steel work. State salary expected, age, and when free to report for work. Address "Z. 26," Engineering News, New York. 26-3t

WANTED—High-class engineers for design of reinforced concerte work, men of wide structural experience and training. State experience and salary expected. TRUSSED CONCRETE STEEL CO., Detroit, Mich. 26-4t

WANTED—Assistant in descriptive geometry and surveying in a prominent Eastern college. Must be a graduate in civil engineering. Experience not necessary. Salary $75-$80 per month. Address, stating experience and references, "A. 26," Engineering News, New York. 26-2t

FOREMAN for punching and riveting gang in structural steel car works; state experience and salary. Address GREGG COMPANY, Newburgh, N. Y. 26-1t

WANTED—A young mechanical, or civil, engineer for the work of inspecting and surveying manufacturing plants for insurance companies. Address "I. 26," Engineering News, New York. 26-1t

WANTED—Experienced mechanical draftsmen for general machinery. Men experienced in heavy pumping machinery preferred. Location, Eastern Pennsylvania. Address "K. 26," Engineering News, New York. 26-tf

ENGINEER WANTED for stone-crushing plant near New York City; familiar with Westinghouse engines and Gates crushers; able to do repairing; advise salary and experience. Address "C. 26," Engineering News, New York. 26-1t

DRAUGHTSMEN AND CHECKERS

Wanted on Structural Steel Work for buildings. Apply by mail only, giving age, nationality, education, experience and salary expected.

POST & McCORD
44 East 23d Street,
New York. 25-4t

MISCELLANEOUS WANTS

Cards under this head are inserted in uniform style, in solid type, at 5 cents a word (address to be counted); displayed (to occupy not less than one inch space), $1.50 an inch. Cash MUST accompany the order in all cases. Copy for Classified Advertisements may be left at any office of the American District Telegraph Co., New York City.

ANDORN & BARNEY CO., Engineers, 150 Nassau St., New York City. Structural steel work a specialty. Write for estimates. 23-5t

NOTICE—The "WANT" Columns of Engineering News are for the special benefit of bona-fide employers or employees, or for those wanting partners, sales agents, etc. Advertisements from employment agencies, schools and like institutions must be inserted under Bureaus and Agencies, at the rate of $1.50 an inch, displayed, or five cents per word.

Circulars addressed to our keyed advertisers will not be forwarded, as our want advertisers have objected to receiving such matter, and we cannot give the time to forwarding them.

Persons answering want advertisements should not send original documents, but copies thereof.

Our readers and advertisers are asked to help us make these columns of the greatest use to those using them.

WANTED.—Will pay 50c. for one copy of Engineering News of Feb. 28, 1878, and 10c. each for copies of Jan. 4, 1906. Cost of postage allowed. Address "A. R. T.," c/o Engineering News, 220 Broadway, New York. tf

WORK WANTED for steam shovel outfit; located near New York City. Address "G. 21," Engineering News, New York. 25-4t

DRAUGHTING
MAP DRAWING AND PRINTING

LARGE FORCE OF COMPETENT MEN.
Rush work given especial attention.
P. F. VON HARDENBERG,
Rooms 513-515,
123 LIBERTY ST., NEW YORK CITY.
Telephone, 2029 Cortlandt. 16-tf

LABORERS

SUPPLIED FOR RAILWAY, WATER-WORKS, QUARRY AND OTHER LINES OF CONSTRUCTION WORK, IN THE UNITED STATES AND CANADA. Estab. 1890
JULIAN BROS., 110 Mott Street, N. Y.
Telephone, 2356 Franklin
BRANCH OFFICE, FORDWICK, VA.

Italian Laborers Supplied
FREE OF CHARGE

For railroad building, water-works, quarries, and all kinds of construction work by

THE LABOR INFORMATION OFFICE
FOR ITALIANS
(Incorporated)

59 LAFAYETTE (formerly Elm) STREET
NEW YORK CITY.

No charge either to applicants for help or to the laborers.

DO YOU want to get into a road which you can MAKE MORE money in laying than you can any other? Which has had a longer practical test as to its PERMANENCE than any of the modern roads are old, in its general construction. The validity of the special improvements of which have been corroborated by late experiments of the Government at Washington. BUSINESS GETTERS ONLY are invited.
THE NASH ROAD, Borough of Brooklyn, New York City, U. S. A.

WANTED FOR CASH
A Steam Road Roller
State weight, make, condition and price tf
Address "T. 400,"
Engineering News Office

WANTED TO BUY
TWO SECOND-HAND
STEAM ROLLERS
Address "G 54,"
Engineering News Office

WANTED
Light Standard Gauge Contractors' Locomotives
WILL PAY CASH
BENJAMIN WATSON
66-70 Beaver Street,
Coffee Exchange Building,
New York City. 20-tf

RE-LAY RAILS
WANTED
2,000 tons (or less) 50, 56 or 60-lb. steel relay rails, with bolts and angles.
J. M. SMITH, 23-4t
349 Main St., Dallas, Texas.

WANTED
Engineers to send for sample copies of
Concrete Engineering
CLEVELAND, OHIO

FOR ADDITIONAL
"MISCELLANEOUS WANTS"
ADVERTISEMENTS
See Construction News page 224.

FOR SALE

Space under this head is sold at the uniform rate of $1.50 an inch; minimum charge, $1.50 a week.

FOR SALE.
Cyclopedia of Engineering
4 Vols., morocco leather. Cost new, $19. Will sell for $5.00. Address "T. A.," Box 425, Chicago, Ill. 20-tf

FOR SALE.
Two Model "G" Marion Steam Shovels
Crowding engines on crane, complete.
Four Warrington Steam Pile Driving Hammers
One Dinkey Engine 9 x 12 Cylinders
One Channelling Machine 20-tf
All in good condition. Located at Buffalo, N. Y.
LATHROP, SHEA & HENWOOD CO., Buffalo, N.Y

FOR SALE.
An Engineering Library
10 Vols. Bound in morocco leather. Cost New, $50. Will sell for $15. Address "T. R.," Box 425, Chicago, Ill. 20-tf

FOR SALE.
24 x 24 x 30
Ingersoll Air Compressor
Used 30 days.
CINCINNATI EQUIPMENT CO.,
24-tf Cincinnati, Ohio.

FOR SALE—USED 30 DAYS.
Air Compressor — Ingersoll
20 x 20¼ x 24 Class A, complete, with air ball governor and air fittings.
Sales Department,
THE CINCINNATI EQUIPMENT CO.,
Cincinnati, Ohio.

Granite Quarries
FOR SALE
On Southern Railway near Edgefield, S. C. Sixty acres; 1,000 feet face, 100 feet deep. FULLY EQUIPPED WITH DERRICKS, MACHINERY AND MACHINE SHOPS, COMMISSARIES, DWELLINGS FOR FOREMEN AND HANDS. One first-class No. 6 AUSTIN GYRATORY CRUSHING PLANT now at work. A bargain. Owner retiring from business. For particulars apply to HALCOTT P. GREEN, Columbia, S. C. 25-6t

Blast Furnace and Ore Beds
FOR SALE.
To Close Estate. All favorably located. Six Miles from Utica.
I. A. WILLIAMS,
24-5t Utica, N. Y.

STEAM ROLLERS
2 Pitts .....12 tons
2 Kellys .....15 tons
Your choice for $1,200.00.
Address "D. 26," Engineering News, New York. 26-1t

Contractors' Machinery
FOR SALE OR RENT
One Dickson 36" gage, 9 x 14, saddle tank locomotive.
One Baldwin standard gage, dummy type locomotive.
16 3-yard, 36" gage dump cars.
55 tons of 30 to 56-lb. relayers with plates.
One dock unloader or land dredge complete with 1-yard orange-peel Hayward dipper.
Harper Machinery Company
Park Row Bldg., New York
Yards and Shops, Bloomfield, N. J.

FOR SALE.
3 1,200 and 1,500-ft. Cableways, 10-ton cap.
9 Cableways, including two Trench Digging Cableways, 300 to 800 ft. in length and 3 to 5-ton cap.
10 Standard Gage, 4 and 6-Wheel Connected Saddle Tank Switchers, 12 to 50 tons in weight.
50 36" Gage, 4 and 6-Wheel Connected, Saddle Tank Switchers, 5 to 25 tons in weight. THE MALES CO.,
26 Cortlandt St. 1507 First Nat. Bank Bldg.,
New York, N. Y. Cincinnati, O.

FOR SALE.
13 4' under-run mill stone, good condition, cast-iron casing with beveled gear, tight and loose drive.
4 No. 5 Smidth Ball Mills.
2 No. 12 Smidth Tube Mills.
These mills were discarded in order to put in larger machinery and were run up to 30 days from above date.
COPLAY CEMENT MFG. CO.,
Penna. Bldg., Philadelphia, Pa. 25-4t

Receiver's Sale
57 3-yd. and 36 4-yd. ALLISON, 3-ft. GAGE, ONE WAY, SIDE DUMP STEAM SHOVEL CARS, located near Quarryville, Lancaster Co., Pa.
ALSO
One NATIONAL GRADER. One PORT HURON 32-HP. TRACTION ENGINE, located near Palmyra, N. Y.
All the above practically good as new.
Calvin E. Brodhead, Receiver,
THE JOHN SHIELDS CONSTRUCTION CO., Room 5040 A. 1 Madison Ave., New York City.

FOR SALE

1 New Model 60 Marion Steam Shovel, 2½-yard capacity, for immediate delivery.

1 New Improved "A" Marion Shovel, 1¾-yard capacity, for immediate delivery.

1 Second-hand Improved "A," 1¾-yard dipper, No. 820.

1 Little Giant Special, 1¼-yard capacity, mounted on standard railroad trucks, three sets engines, immediate delivery.

3 9 x 14, 36-in. gauge Baldwin saddle tank locomotives, with steam brake.

2 9 x 14, 36-in. gauge, 12-ton saddle tank Porter locomotives.

30 3-yard 36-in. gauge one-way Allison dump cars.

30 4-yard one-way Allison dump cars.

1 New 6 x 8 double cylinder, double friction drum Carlin skeleton hoisting engine.

1 New 7 x 10 double cylinder, double friction drum Carlin hoisting engine.

1 New double cylinder, double friction drum Carlin hoisting engine, with boiler.

Also an assortment of extra heavy derrick fittings and Oregon fir timber.

Thomas Carlin's Sons Co.
1600 River Avenue, Allegheny, Pa.

Locations for Industries
ON
THE ERIE, THE COMMERCIAL RAILROAD
New York to Chicago

The Erie Railroad System's Industrial Department has all the territory traversed by the railroad districted in relation to resources, markets and advantages for manufacturing, can advise with manufacturers of specific products as to suitable locations, and furnish them with current information of a comprehensive nature dealing with the project in its full relation to manufacture and commerce. Address

LUIS JACKSON
Industrial Commissioner
Erie Railroad Company
11 Broadway, New York

Books on LETTERING
by O. W. BRENNARDT. Price, $1.00
by Prof. H. G. JACOBY. Price, $0.00

Situations Wanted

Received too late for pages 40 and 41. Copy should be received by Tuesday a. m.

Civil Engineers.

ENGINEER, C. E., age 30, experienced in design and inspection of mill buildings and railroad structures. Also general engineering experience. Permanent position considered. $200.00. Address "PERMANENT," 1636 Monadnock, Chicago. 26-1t

Draftsmen.

DRAFTSMAN—Young man desires position with civil engineering or contracting firm. Has 2 years' experience in drafting. Address "W. A. 26," Engineering News, New York. 26-1t

Superintendents, Misc., etc.

ASSISTANT ENGINEER, technical graduate, 5 years' general municipal and railroad experience, drafting, estimating, superintending; good executive ability. Address ——, Engineering News, New York. 26-2t

THE ADVERTISER SEEKS any position of responsibility, being desirous, for creditable reasons, of leaving present field of work. A broad experience through management of extensive contracting operations and shop work. A man of ability; technically educated; of good address; age 37. Address, for particulars, "I. 20," Engineering News, New York. 26-1t

CONSTRUCTING ENGINEER in charge of large job of general construction and reinforced concrete completed Dec. 31, wants position with New York City firm. Economic handler of men and material and good estimator. Connell graduate; age 26. Address "S. A. 26," Engineering News, New York. 26-2t

POSITION WANTED by young man 25 years old; 3 years' experience as timekeeper and light bookkeeping with contractor. References. Address "X. A. 26," Engineering News, New York. 26-1t

CONTRACTOR'S SUPERINTENDENT and engineer; technical education; 12 years' experience in designing, estimating and handling contract work in field and from office. At present employed by large contracting company as superintendent. At liberty Feb. 1. Executive office position preferred. Address "Z. A. 26," Engineering News, New York. 26-5t

WANTED—Position as inspector (steel bridging preferred) by I. C. S. advanced student, 8 years' experience in steel and timber bridging, masonry and timber inspections. Best of references. Middle West preferred. BOX 56, Stantonville, Tenn. 26-4t

ENGINEERING student (22) desires position as rodman or instrumentman; 16 months' experience on railroad construction. Address "B. A. 26," Engineering News, New York. 26-1t

FOR ADDITIONAL
"SITUATION WANTED"
ADVERTISEMENTS
See Construction News page 224.

Situations Open

A RAPIDLY GROWING CONCERN manufacturing patented machine specialties, wishes to secure permanently, a treasurer and purchasing agent, each willing to invest about $10,000 in preferred stock of the company. The additional capital would be used in the enlargement of plant. Profits made in the past insures fulfillment of company's guarantee of 8 to 10% cumulative dividends. It is thought a vested interest will inspire greater efforts. An investment will, however, be a consideration secondary to ability, and those without the highest references and qualifications need not apply. Give all particulars in first letter. Address "C. 24," Engineering News, New York. 26-1t

WANTED—Superintendent. Expert in piece work schedules and with extensive experience in manufacturing freight cars and locomotives on commercial basis. Plant near Chicago. Address "M. 26," Engineering News, New York. 26-4t

WANTED—Young man to learn business; one having experience in building or contracting business preferred. State age and salary wanted. Must have reference. Address "O. 26," Engineering News, New York. 26-2t

DRAFTSMAN—For newly established engineering department of rapidly growing paper-manufacturing plant. Young technical graduate with some experience in mill construction and machinery layouts. One able to handle transit preferred. Chances of advancement exceptional. Address "P. 26," Engineering News, New York. 26-1t

FOR SALE

CONTRACTOR'S PLANT

formerly used by

SAND FILTRATION CORPORATION OF AMERICA

AT WASHINGTON, D. C.

CABLEWAYS	PUMPS
CONVEYORS	BLACKSMITH'S AND CONTRACTOR'S TOOLS
STEAM ROLLERS	DERRICKS
DUMP WAGONS	WHEEL AND DRAG SCRAPERS
ROCK CRUSHERS	BUCKETS
HOISTING ENGINES	HARNESS
DRILLS	WALL TENTS
BOILERS	GAS ENGINES
PILE DRIVERS	DUMP CARS
STATIONARY ENGINES	

LOCOMOTIVES—STANDARD AND NARROW GAUGE.

CONTRACTOR'S EQUIPMENT AND GENERAL SUPPLIES.

Apply for Descriptive Sheets and Prices. Buy Direct from Representative of Owners and Save Money

BENJAMIN WATSON

66-70 Beaver St. (Coffee Exchange Bldg.) NEW YORK CITY

20-tf

FOR SALE — IMMEDIATE DELIVERY

LOCOMOTIVES

18 x 24 Dickson American type, 50 tons, standard gauge, all modern appliances, fine order, elaborate fixtures in cab, brand new tender.

16 x 24 Taunton, American type, 35 tons, just out of shops, first-class condition.

AT PRACTICALLY BUYER'S PRICE TO CLOSE AN ACCOUNT.

Also one 12 x 16 Dickson, 4 wheel, saddle tank, standard gauge, fine shape, weight 22 tons.

Two 9 x 14 Porter saddle tanks, 36-in. gauge, first-class condition, boilers inspected.

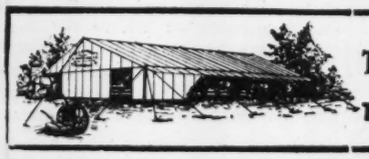
DALLETT & COMPANY, 611-612 Harrison Bldg., Philadelphia, Pa.

WANTED to BUY — LOCOMOTIVE

15-inch or 16 x 24-inch 4-driver or heavier

SADDLE TANK PORTER—Standard Gage

Sales Department, THE CINCINNATI EQUIPMENT CO., Cincinnatti, Ohio



Water Proof Tents
Tarpaulins, etc., for Contractors
Send for Estimates
The J. A. McAuley Tent and Awning Co.
85 W. State Street, Columbus, Ohio

CONTRACTORS' AND STABLE TENTS
PLAIN WATERPROOFED MILDEWPROOFED
COLUMBUS TENT & AWNING CO., Columbus, O.

FOR SALE.

Sand and Gravel Washing Plant

FORMERLY USED BY

Sand Filtration Corporation of America

at Hyattsville, Md.

This is a complete, thoroughly up to date plant, has a capacity of 700 yards daily, and is in close proximity to sand and gravel pits, yielding an almost inexhaustible supply of good material.

It consists of

Pumps,	Buildings,
Conveyors,	Shafting,
Screens,	Pulleys,
Engines,	Belting,
Locomotive boilers,	Piping and fittings,

and a large quantity of tools and minor equipment essential to such a plant.

For full information address

BENJ. WATSON, Sales Agent
Coffee Exchange Building,
66-70 Beaver Street,
New York City.

Contractors' Equipment and General Supplies

24-tf

Miscellaneous Wants

CONTRACTOR'S SUPERINTENDENT and engineer; technical education and services to invest in contracting, engineering, machinery manufacturing or agency business. Good connection desired more than investment. Address "A. A. 26," Engineering News, New York. 26-3t

STRUCTURAL ENGINEERS

Designs, estimates and shop drawings for steel works furnished in any part of the United States.

Bridges, mill buildings, fireproof construction. Also reinforced concrete and foundation work.

BRIGANTI & STEENEKEN
205 East 17th St., New York

FOR ADDITIONAL
"MISCELLANEOUS WANTS"
ADVERTISEMENTS
See Construction News page 224.

FOR SALE
See first column for rates

FOR SALE.

60 1¼-yd., 24" gage
WESTERN DUMP CARS
18 2-yd., 36" gage Western
Good order.
Sales Department,
THE CINCINNATI EQUIPMENT CO.,
Cincinnati, Ohio.

FOR SALE.

16-inch Hydraulic Dredge

High Power, immediate delivery.

W. H. LE CHARD,
26-2t Wildwood, N. J.

FOR SALE.

HOISTING ENGINE

AMERICAN 8¼ x 10 D. C. D. D., with Boiler and 2 Independent Winch-heads. Fine condition.

CONCRETE MIXERS, CRUSHERS, BOILERS, PUMPS, ETC.

THE NEW YORK PURCHASING AGENCY, INC.
76 Pine St., New York. 26-1t

FOR SALE.

75 consecutive bound volumes of Minutes Institution C. E. from 1881 to 1900
20 bound volumes Engineering News to 1903
19 bound volumes Engineering Record to 1903
6 bound volumes Transactions Am. Soc. C. E., 1886, 1887 and 1888.

Address "R 26" Engineering News, New York. 26-2t

"Value Received"

is the reply we receive from our Want Advertisers.

FIGURES SHOW

that ENGINEERING NEWS printed

3302

"Situation Wanted," "Miscellaneous Wants," and "Situation Open" advertisements in the first 26 issues of 1906, which was

FIVE TIMES

the number printed by any other Engineering Journal during the same time.

"OPPORTUNITY

knocks but once at every man's door." DON'T WAIT for a second call.

Let the People Know Your Wants

If you are an employee and want a better position, or if you are an employer and want a better man,

ENGINEERING NEWS

can accommodate you, for our readers are the leading engineers of the world and are known by their

QUALITY

Equipment for Contractors

HOISTING ENGINES

Fifte[en] 7 x 10 Lidgerwood D.C. D.D. Skeleto[n] Hoisting Engines.

Two [7] x 10 Lidgerwood D.C D.D Skeleton Hoisting Engines. (One with Boiler.)

Two [8] x 10 Ryan & McDonald and one 10 x [12] Lidgerwood D.C D.D Hoisting Engines.

One [10] x 16 Mundy D.C Hoisting Engine, with Boiler; has large single drum.

One [8] x 10 and one 5½ x 12 Single Drum Hoists, with Boilers.

One [6½] x 8 and one 5 x 8 Double Cylinder, Single Drum Lidgerwood Quarry Hoists; capacity to lift 15 to 25 tons on single rope.

Two 15-HP. Double Drum Lambert Electric Hoists, with 500-volt motors and controllers; these are new outfits.

MISCELLANEOUS

14 x 14 x 18 Hall Air Compressor; capacity, 350 cu. ft., with Air Receiver.

10 x 9, 10 x 10, 10¼ x 12, 11 x 10, 12 x 12 and 12¼ x 14 Belted Air Compressors; 125 to 200 cu. ft. capacity for air pressure up to 100 lbs.

Cockburn Concrete Mixer with engine capacity 25 to 30 cu. yds. per hr.

Ransome Concrete Mixer with Boiler and Engine; 30 cu. yds. per hr.

Ransome Concrete Mixer with engine capacity 40 cu. yds. per hr.

Brennan Jaw Crusher opening 36 x 15.

Brennan Jaw Crusher opening 27 x 10.

Western Jaw Crusher 9 x 15 with screen and elevator.

3¼ and 3½ Ingersoll-Sergeant Rock Drills.

Two Ingersoll-Sergeant Channeling Machines.

Two 14 x 10¼ x 10 Worthington Pumps, 6" dia.

One 12 x 16 x 18 Blake Pump, 12" dia

One 12 x 13 x 10 Worthington Pump, 10" dia.

Single and Duplex Steam Pumps of every size, type and make manufactured.

3 to 12" Centrifugal Pumps, engine or belt driven.

Derricks of all kinds.

Four 36" gage Dinkey Locomotives.

Two Lidgerwood Cableways, 12¼ x 15, engines, cable towers, etc., complete.

Deep Well Pumps, all sizes.

Gas and Gasoline Engines.

15, 20, 25, 30, 35, 40, 50 and 60-HP. and larger Locomotive Portable Boilers on wheels or skids.

Wickes Brothers

139 Liberty Street, New York City

Contractor's Machinery

NEW AND REBUILT

HOISTING ENGINES
One, two and four drum, double cylinder, with and without boiler, 17 in all.

STEAM PUMPS
Single and duplex 22 in number. Emerson Vacuum Steam Pumps.

BOILERS
Horizontal, Vertical and Portable Boilers for Heating and Power Purposes, 21 in all.

STEAM ENGINES
Vertical, Horizontal and Automatic Engines, 29 in all.

AIR COMPRESSORS
Steam, Gas, and Belt Driven Compressors.

GAS ENGINES
For Electric Lighting, Pumping, Air Compressing and General Power Service.

Corlies Machinery & Supply Co. Inc.

INC.
225 Sandusky St., Allegheny, Pa.

FOR SALE.

Two Western Graders, Complete

Both for $1,000 f. o. b. Cincinnati, Ohio. Used 90 days.

Sales Department,
THE CINCINNATI EQUIPMENT CO.,
Cincinnati, Ohio.

FOR SALE.

SEVERAL ONE YARD AND ONE AND QUARTER YARD

Hayward Orange-Peel Buckets

ALSO SMALLER. VERY LITTLE USED. BOILERS, CONCRETE MIXERS, COMPRESSORS, ETC.

THE NEW YORK PURCHASING AGENCY, INC.
76 Pine St., New York. 26-1t

The Old Machinery

or plant, or tools for which you have no present use might be sold or rented to some other reader of Engineering News by the investment of a few dollars on one of our "For Sale" pages.

Of Special Interest to Contractors

Here's a chance for you to pick up a snap in Machinery and Supplies. The following items are in our stock for quick delivery and will be sold at an extremely low price.

COMPLETE STONE CRUSHER AND QUARRY EQUIPMENT.

We have for sale a complete plant all in first-class condition, ready for immediate delivery; can be operated at its present location in Northern Illinois. The plant consists of the following material:

3 72 x 18 Horizontal Tubular Boilers.
1 18 x 42 Corliss Engine.
1 200-HP. Feed Water Heater.
3 Pumps.
1 No. 8 Gates Crusher, complete with Elevators, Screens, Two Friction Hoists, Rails, Headers, Ties.

This plant will be sold either complete or in part and we can make immediate delivery. If you are looking for a bargain, write us quick.

STRUCTURAL IRON AND STEEL.

10,000 tons Beams, Channels, Angles, Tees and Structural Iron of every kind.
5,000 tons Cast-Iron Columns in all shapes and lengths.
3,000 tons Relaying Rail.
28 Roof Trusses, 28' 10".
8 Roof Trusses, 34' 9".
2 Roof Trusses, 24'.
5 Girders, 18' long.
5 Girders, 32' 8" long.
40 Girders, 30' long.

All kinds of shapes made to order. Ask for "STRUCTURAL IRON NEWS."

PIPE BARGAINS.

From the St. Louis World's Fair for Chicago Delivery.

110,000 ft. 4-in. O. D. wrought-iron lap welded casing, good as new.
100,000 ft. 3, 3½, 6 and 8" O. D. wrought iron lap welded casing, good as new.
26,000 ft. 8" standard wrought-iron.
6,500 ft. 10" standard wrought-iron.
7,000 ft. 12" standard wrought-iron.
2,500 ft. 16" standard wrought-iron.
1,400 ft. 10" spiral riveted.
1,500 ft. 11" spiral riveted.
2,000 ft. riveted steel pipe from 8 to 72".
50 miles of smaller pipe.

TANKS.

Several 6,000-gallon steel storage tanks, with domes of standard size, made of ¼" iron, extra strong; good as new; immediate delivery from various points in the East.

CULVERT PIPE.

1,000 ft. 24-in. cast-iron culvert.
1,500 ft. riveted steel culvert pipe; sizes, 16, 18, 20, 24, 30, 36, 42, 48, 54, 60, 66 and 72-in.
2,000 ft. 16-in. wrought-iron, lap welded.

CENTRIFUGAL PUMPS—BELT DRIVEN

2 10" Morris Water Pumps.

DREDGE.

One complete Lidgerwood Orange-Peel Dredge, with 1¼-yd. Hayward bucket; 50-HP. boiler. Practically new; used two years.

Special price for quick sale and shipment.

DUMP CARS.

50 Sheffield Steel Cars, 21½" gage; capacity, 23 cu. ft. rotary dump.

Ask for our Special List No. 258

CHICAGO HOUSE WRECKING COMPANY, 30th and Iron Sts., Chicago

OUR ADVERTISERS WILL SUPPLY YOU

Write the advertisers in ENGINEERING NEWS when in the market for engineering or contracting supplies, or wish to have new works planned or built. Should our advertisers be unable to help you, write us and we will refer you to the right firms.

We also call your attention to our "Situations Open" and "Situations Wanted" columns, when high-class technical help is required.

ENGINEERING NEWS, 220 Broadway, New York

FOR SALE

One MODEL "G" Steam Shovel, overhauled; fine condition.
One 45-ton SOUTHER.
One J. I. Case Traction Engine.
One Buffalo Pitts Traction Engine.
One 9 x 14 Porter Locomotive.
One 9 x 14 Davenport Locomotive.
One 10 x 16 Baldwin Locomotive.
Four 4-wheeled Switching Locomotives, with tenders.
One Western Wheeled Co.'s Grader and Wagon Loader.
One Ingersoll-Sergeant Air Compressor, 807 ft.
Forty concrete cars, 18-in. gauge.
One Buffalo Pitts 10-ton Road Roller.
One Kelley-Springfield 15-ton road roller.
NEW ENGLAND AGENTS for the J. I. Case Threshing Machine Co., Vulcan Locomotives.

EASTERN EQUIPMENT CO., Machinery Exchange, 10 Oliver St., Boston

The Chemical Engineer

RICHARD K. MEADE, Editor.

A monthly journal of practical, applied and analytical chemistry designed for chemical engineers. The only journal in the United States devoted to the chemical industry.

Beginning with Volume V. (November, 1906), this paper has been enlarged and improved in form and appearance and important departments added to the magazine section.

Subscription reduced from $3.00 to $2.00.

SPECIAL SUBSCRIPTION OFFER

THE CHEMICAL ENGINEER PUBLISHING COMPANY,
Pennsylvania Arcade, Philadelphia, Pa.

Gentlemen:—Enclosed please find $2.00, for which send

The Chemical Engineer

beginning with Volume V (November, 1906), until January 1st, 1908.

Name.....

Address.....

.....

Modern Tunnel Practice

Illustrated by Examples Taken from Actual Recent Work

By DAVID McNEELY STAUFFER

M. Am. Soc. C. E.; M. Inst. C. E.
Vice-President Engineering News Publishing Co.

CONTENTS

Chapter I. Tunnel Location and Surveying
II. Explosives
III. Blasting
IV. Notes on Shaft Sinking
V. Principles of Tunnel Timbering and Driving
VI. Tunnel Arch Centres
VII. Sub-Aqueous Tunnels and Tunnel Shields
VIII. Subways, or Underground Railways
IX. Special Tunnel Building Plant
X. Some Data Upon the Cost of Tunneling
XI. Ventilation of Tunnels
XII. Air Locks
XIII. Tunnel Notes
XIV. Description of the Construction of the Simplon Tunnel and Several Tunnels for Special Purposes
Appendix: Glossary of Some of the More Unusual Terms used in Tunneling
Full Index to Text and Illustrations

More Complete Tables of Contents Sent on Request

Cloth; 6¼ x 9½ inches; 314 pages; 138 illustrations
Price, $5.00, net

THE ENGINEERING NEWS PUBLISHING COMPANY
220 Broadway, New York

FOR SALE

Space under this head is sold at the uniform rate of $1.50 an inch; minimum charge, $1.50 a week.

Three Steam Rollers

For Sale or Rent Very Little Used

Address Z. V. 99, Engineering News

FOR SALE OR RENT

STEAM ROAD ROLLERS

In first-class condition.

Several machines only slightly used. For particulars address

U. S. 57, Engineering News 25-tf

FOR SALE

Steam Road Rollers

for macadam and other work

CONDITION GUARANTEED

For particulars address

M. K. 33, Engineering News

FOR SALE.

PETTYJOHN PORTABLE BLOCK MACHINE PATENTS

for twelve foreign countries. Fastest machine made. Biggest American seller. U. S. not for sale.

PETTYJOHN COMPANY
Terre Haute, Ind.

For SALE or RENT

Steam Road Rollers

Several Machines Almost New

Address:

J. C. 19, Engineering News

200 SECOND-HAND TRANSITS and LEVELS CHEAP

ARCHITECTS' AND ENGINEERS' SUPPLY CO
010 Grand Ave., Kansas City, Mo.

FOR SALE CHEAP

All sizes and any quantities of

Second-Hand Pipe and Boiler Tubes

in first-class condition.

Also second-hand gate valves 2 to 8 inches inclusive.

PITTSBURG PIPE & IRON COMPANY
McKees Rocks, Pa.

FOR SALE

Several Steam Road Rollers

Per Macadam and Other Work

Different Styles and Weights. Will sell cheap

Address

P. Q. 34, Engineering News tf

STEAM SHOVELS

One NEW Marion model 60.
One Marion model 80.
Three Marion model "G."
Two Bucyrus, 70 ton.
Two Vulcan, 70 ton.
1½, 2, 3 and 4-yd. dump cars, 36-in. gage.

J. C. SAXTON, 18 Broadway, New York

FOR SALE

One Lambert Sewer Cableway

slightly used; complete with A frames, rope, including Lambert Patent Combination Derrick and Cableway Engine, with boiler, all in good condition.

AND

One 550-feet Span, 3-ton Capacity Cableway Without Towers

complete with Lambert Patent Combination Derrick and Cableway Engine with boiler in A-1 condition.

Address H. L. 18, Engineering News, New York

Road Contractors Attention!

STEAM ROAD ROLLERS FOR SALE

Several styles. All in A-1 condition.

Address, for particulars, A. C., 24, care of Engineering News, New York tf

FOR SALE

50 36-in., 3½-yds.

Ryan-MacDonald Dump Cars

40 36-in., 2½-yds.

Western Dump Cars

BRUNO, SALOMONE & PETITTI, Contractors,
12-tf 23 Court Street, Boston, Mass.

For Sale

30-in. Gauge 11½ ton six driver PORTER LOCOMOTIVE, good condition.

WALTER A. ZELNICKER SUPPLY CO.,
17-tf St. Louis, Mo.

FOR SALE

3 ½-yd. McKelvey Concrete Mixers.

1 ½-yd. McKelvey Concrete Mixer.

1 15-Roll Mercerizing Plant, complete with two-ton air hoist and track, made by Smith & Drum.

For particulars and other information apply to HENRY A. HITNER'S SONS, Huntingdon St. and Aramingo Ave., Philadelphia, Pa.

Steam Shovels, Locomotives, Cars, Etc.

RAILWAY AND CONTRACTORS' EQUIPMENT

What Are Your Requirements?

Telegraph, Telephone Or Write Us

A. C. TORBERT & COMPANY

547-548 MONADNOCK BLOCK, CHICAGO SHOPS AT CHICAGO

Long Distance Telephone: Harrison, 4425

FOR SALE

One New Model 60, Marion, 65-ton, 2½-yard dipper
One New Model 50, Marion, 55-ton, 2-yard dipper
One New Bucyrus, 70-ton, 3-yard dipper

All have three sets of engines. Immediate Delivery

SALES DEPARTMENT
THE CINCINNATI EQUIPMENT COMPANY
CINCINNATI, OHIO

M. E. DAVIS, Eastern Sales Agent

WESTERN WHEELED SCRAPER COMPANY

NEW YORK OFFICE, 829 PARK ROW BLDG. 'Phone, 7232 Cortlandt.

Immediate shipment from nearby stock of **Wheeled and Drag Scrapers, Plows, Wagons, etc.**

Clam Shell Buckets

In Stock for Immediate delivery.

Capacities, 1 and 1½ yards.

THE NORTH PENN IRON CO.,
17-tf 8d and Venango, Philadelphia, Pa.

RAILS FOR SALE

QUICK SHIPMENT.

100 tons 70-lb. relaying steel "T" rails and angle bars.
200 tons 65-lb. relaying steel "T" rails and angle bars.
900 tons 60-lb. relaying steel "T" rails and angle bars.
300 tons 56-lb. relaying steel "T" rails and angle bars.

All sizes of new rails in stock at our yard. Write or wire us for prices.

IRON CITY STEEL COMPANY,
1210 Bessemer Building, Pittsburgh, Pa.

LOCOMOTIVES

150 locomotives, narrow and standard-gauge from 6 to 65 tons.

80 Forney type elevated engines, 25 tons, owned by us, suitable for contractors. Brooklyn, N. Y., or Atlanta delivery.

Write us for locomotives or cars.

Southern Iron and Equipment Co.

ATLANTA, GA.

FOR SALE.

Immediate Shipment.

Bucyrus Shovels

65-ton; No. 569. 70-ton; No. 575.

First-class Condition.

4 3-ft. gage, 9" x 14" Porter locomotives. Built 1904-05.

BENJAMIN WATSON
66-70 Beaver Street,
Coffee Exchange Building
New York City. 20-tf

New York Elevated R.R. Locomotives

FOR SALE.

One 10-ton Universal Steam Roller

One 10-ton Buffalo Pitts Steam Roller

Built 1904.

BENJAMIN WATSON, Agent,
Coffee Exchange Building,
66-70 Beaver St. New York City.
20-tf

Desirable Bargains in

Steam Shovels, Locomotives, Dump Cars, Hoisting Engines, Derricks, etc.

New and Relaying Rails

If you have a released equipment for sale, advise us particulars.

H. P. MILLER & CO.
23-18t Real Estate Trust Bldg., Phila.

"SPECIAL"

FOR SALE.

9 steel dump carts.
14 Austin bottom dump wagons, 1½ yards capacity.
4 Watson bottom dump wagons, 2 yards capacity.

AT THE RIGHT PRICE.

BENJ. WATSON
66-70 Beaver St.,
N. Y. City.

Contractors' Outfits

Bucyrus, Marion

AND

Vulcan Steam Shovels

FOR IMMEDIATE DELIVERY

GEORGE S. WOODRUFF
19-tf Crozer Building, Philadelphia

FOR SALE.

SHAFTING

59 ft. 2½".
49 ft. 1 15/16".

HANGERS

Seventeen 15" drop.

STEEL PULLEYS

Eight 28" diameter x 8" face.
One 48" diameter x 9" face, 2½" bore.
Two 18" diameter x 7" face.
One Mule Pulley, complete, 14 x 4.
Two Wood Pulleys, 24 x 4 x 18 x 4.

Two Cranston Clutch Pulleys, complete.

One Jack Shaft, 2½" diameter, 6 ft. long.

One 25-HP. Crocker-Wheeler Motor; first-class order.

One 15½-HP. Gas Engine, Vreeland make, with water tanks; all in first-class order.

Also large supply of belting; practically new.

C. J. O'BRIEN
227 William St., New York City

FOR SALE CHEAP.

1 50-KW. D. C. Generator.
1 14" x 36" Corliss Engine.
1 150-HP. Armington & Sims Engine.
1 80-HP. Armington & Sims Engine.
1 14" x 20 x 10 x 15,
1 14 x 4 x 10 and
1 14 x 7 x 10 Worthington Fire Pumps.
1 7 x 10 Skeleton Hoisting Engine.
1 150-KW. Direct Connected Generator.

O. R. WHITNEY, 39-41 Cortlandt St., N. Y.

FOR SALE.

One 30 and One 40-H. P.

Portable Farrar & Treft's Boiler

fittings and stacks.

Three 10 x 12 x 12-inch

Low Pressure Snow Steam Pumps

10-inch suction 8-inch discharge; with suction, strainers, discharge, feed and exhaust pipes.

All the above used less than ninety days. In good order. Terms cash. Address

AKRON GYPSUM CO.
23-4t Akron, Erie Co., N. Y.

FOR SALE.

2 New Model 60 Marion Steam Shovels, immediate delivery.
1 New Model 20 Marion Steam Shovel, immediate delivery.
1 45-ton Bucyrus Shovel, thoroughly overhauled, immediate delivery.
2—9 x 14 Porter Locomotives, 36" Gauge.
25 3-yard "I" Beam Western Cars.
14 4-yard "I" Beam Western Cars.

HARRY W. PICKETT,
House Building, Pittsburg, Pa.
Lynchburg, Va.

FOR SALE.

One Model 80 Marion Shovel

due to leave shops December 16th.

H. W. PICKETT

House Bldg., Pittsburg, Pa.
Lynchburg, Va.

THE COST OF A "WANT" ADVERTISEMENT in ENGINEERING NEWS is 1½ cents a word, an insertion, for "Situations Wanted" and "Situations Open," and 2 cents a word for "Miscellaneous Wants"

Contractors' Equipment For Sale

Steam Shovels

1 New Model 60 Marion.
1 New Model 50 Marion, 2-yd. dipper.
3 Model 60 Marions, used 1 year.
1 Model G Marion, 2 years old.
1 Model 20 Marion, 1 year old.
1 Style A Marion, 1½-yd. dipper.
2 Style C, ¾-yd. dipper Marions.
1 Model 20, 3 sets engines; used 30 days.
2 70-ton 3-yd. dipper Vulcans.
1 60-ton 2-yd. dipper Vulcan.
2 Little Giant Vulcans, standard-gage trucks.
1 Little Giant Traction.
1 New Little Giant, standard-gage trucks.
1 45-ton Victor, 3 sets engines.
1 New 70-ton Bucyrus.
2 65-ton Bucyrus, 2½-yd. dipper.
1 70-ton Bucyrus, 2½-yd. dipper.
2 55-ton Bucyrus, 2-yd. dipper.
1 45-ton Bucyrus, 1¾-yd. dipper.
1 2-yd. dipper Cran pattern.

Locomotives

10 9 x 14 36-in. gage Porter Dinkies.
4 9 x 14 36-in. gage Baldwin Dinkies.
2 9 x 14 36-in. gage Dickson Dinkies.
2 9 x 14 36-in. gage Vulcan Dinkies.
2 8 x 12 36-in. gage Porter Dinkies.
1 7 x 12 36-in. gage Baldwin Dinky.
1 7 x 12 36-in. gage Porter Dinky.
3 10 x16 36-in. gage Porter Dinkies.

Also Standard Gage Saddle Tank, Mogul, 10-wheeler and Consolidation Type Locomotives of all sizes and classes Eighty 1¼-yard 24 inch Gage Western Dump Cars; Forty 5-yard Standard Gage Western; Sixty 6-yard Standard Gage K. & J. Dump Cars.

Flat, Box and Coal Cars, and Equipment of every description.

THE CINCINNATI EQUIPMENT COMPANY

CINCINNATI, OHIO

FOR SALE

Contractors' Equipment

We offer for sale the following material for prompt delivery:

4 Vertical Air Receivers, 60" x 14' 6".
1 2,000-HP. Improved American Heater.
1 65-HP., No. 11, Type No. 5, 500-Volt Belted Generator, with switchboard.
1 10" x 9" Westinghouse, Jr., Engine, 62 HP.
40 Vertical Boilers, 20, 30, 36 and 40 HP., complete with fittings.
72 One-Way Dump Cars, four yards capacity, standard Allison pattern for 3 ft. gage of track.
7 Guy Derricks, 45 to 80 ft.; also Stiff Leg Derricks, 40 to 60 ft. boom.
4 Snow Duplex Pumps, 6 x 4 x 6.
50 one-yard Dump Buckets.
8 ½-yard Dump Buckets.
4 ¾-yard Dump Buckets.
1 Lidgerwood Cable Way, complete with 800 ft. 2" cable, 60 HP. engine, double drum, without boiler.
4 J. I. Case Traction Engines, 24 HP.
4 Alfred Box & Co.'s 10-ton Hoist Blocks.
1 Atlas Engine, 10 x 14, 40 HP.
1 18" Champion Blower.
1 Tranter & Davison Gasoline Engine, 8 HP.
1 Sturtevant Engine, 3½ x 4.
1 Canedy-Otto Drill Press, No. 14.
1 75-HP. Dick & Church Automatic Center Crank Engine.
1 Seyfort Engine, 7 x 7, 12 HP.
1 Emery Machine.
1 Punch & Shear Combination, hand power.
3 six-yard capacity Standard Gage, 2-way Dump Cars.
6 Centrifugal Pumps, 8" suction, 6" discharge.
1 Centrifugal Pump, 6" suction, 4" discharge.
2 Snow Duplex Pumps, 10 x 7 x 10.
1 Snow Duplex Pump, 7 x 6¾ x 8.
1 Worthington Duplex Pump, 6 x 4 x 6.
2 Rand Drill Co.'s Imperial, type No. 10 Air Compressors.
1 Double Cylinder, Double Drum Lidgerwood Skeleton Hoisting Engine.
1 Double Cylinder, Double Drum Lidgerwood Mounted Hoisting Engine.

All of the above material is practically new, having been used only about nine months, and we guarantee same to be in perfect condition.

For prices and other information apply to HENRY A. HITNER'S SONS, Huntingdon Street and Aramingo Avenue, Philadelphia, Pa.

21-tf

Steam Shovel To Let

One Marion Style "A" Steam Shovel, standard railroad gauge, 1¾-yard dippers

REBUILT AND IMPROVED

Immediate shipment. Experienced crew, who have worked the shovel for the past year, or more, are ready to go with the steam shovel

TROY PUBLIC WORKS COMPANY

R. W. SHERMAN, President

Utica, N. Y., and 1154 St. Nicholas Avenue, corner Broadway and West 168th Street, New York City

FOR SALE

65 Standard Gauge, 6 Yard, Two-Way Dump Cars

40 Ryan & McDonald. Used few weeks. Good as new. Bargain price.
25 Continental. New. Right price. Immediate delivery.

DALLETT & CO., 611-612 Harrison Bldg., Philadelphia, Pa.

FOR SALE

50 H.P. Automatic Straight-Line Engine

JAS. S. BRADEN
26 Cortlandt Street New York

DUMP CARS

Mine, Plantation and Freight Cars
Castings of All Kinds
Chattanooga Car & Foundry Co.
CHATTANOOGA, Tenn.

Second-Hand

Road Rollers

For Sale

	MAKE	WEIGHT	PRICE
2	Pioneer	5-ton Tandem	$900 ea.
1	"	5 " "	950
1	"	12 " "	1,500
1	"	12 " "	1,900
1	Erie	5 " "	750
1	"	5 " "	800
2	Buffalo-Pitts	10 " 3-whl. Macadam,	1,400 "
1	"	12 " " "	1,650
1	"	12 " " "	1,800

The Barber Asphalt Paving Co.
Philadelphia 24-3t

RAILS

NEW AND RELAYING

Frogs and Switches
Locomotives and Cars
Prompt Shipments

Immediate attention given all communications. Write, telegraph or telephone us for particulars.

HYDE BROS. & CO.

PITTSBURGH, PA.

FOR SALE.

1 second-hand wrought iron deck turntable, 50' long.
1 cast-iron turn-table, 36' long.
1 drawbridge, 234' long, end to end; will give 100 feet clear openings; designed for 3,000 lbs. per lineal foot rolling load; weighs about 150 tons.

For further particulars, price, etc., address A. L. SANGER, Purchasing Agent, Pere Marquette R. R. Company. 23-4t

Orange Peel and Clam Shell Buckets
Hoisting Engines
Concrete Mixers

For prompt delivery.

GEORGE S. WOODRUFF,
Crozer Building, Philadelphia.

CARS FOR SALE

40 WESTERN 1¼-YD. 24-IN. GAGE CARS.
16 WESTERN 2-YD. 36-IN. GAGE CARS.

CINCINNATI EQUIPMENT CO.,
24-tf Cincinnati, Ohio.

For Sale! For Prompt Shipment!
FIRST-CLASS

Relaying Steel T-Rails

35-lb., 40-lb., 56-lb., 60 lb., and other weights; also all weights of NEW RAILS for quick shipment. Advise weight of rail wanted and tonnage. We sell Frogs and Switches cheap.

ROBINSON & ORR
419 Wood Street, Pittsburgh, Pa.
We have a number of Second-Hand Locomotives.

Books on LETTERING
By C. W. REINHARDT. Price, $1.00
By Prof. H. S. JACOBY. Price, $3.00

RAILS

12 to 40 lbs. per yard.

In stock for immediate shipment, from our Works, Passaic, N. J.

Switches and Industrial Track

Wonham & Magor

Dept. L, 29 Broadway, New York

RAILS For All Purposes

New or Relaying

always in stock and shipped day order is received. All weights and sizes—from 12 to 100 pound sections. Second-hand rails cut any length.

Write or wire to

L. B. Foster Company

619 Park Bldg., Pittsburg, Pa.

RAILROAD FENCE

"Pittsburgh Perfect"

Is the only fence made where every ounce and inch of wire in it adds to its utility, strength and effectiveness.

The only fence in the world in which each upright or stay wire helps the other stay wires to support the line wires. This is because the stay wires and the line wires are practically one piece: the electric weld does it. Any fence in which the stay or upright wires are of smaller gauge than the line wires is only as strong as the stay or upright wires.

The only fence of its kind. The strongest; on account of its construction as much stronger than steel as steel is stronger than wood.

WELDED BY ELECTRICITY

Sectional view—Amalgamation Perfect. No Seam.

"PITTSBURGH PERFECT" FENCES ARE THE BEST BECAUSE

1. Wire not twisted, wrapped nor clamped, to break the galvanizing and cause rust.
2. Stays stay where we put them and cannot be moved out of place.
3. No projections to injure stock.
4. Stronger at the joints than any other fence. Welded together by electricity.
5. All line wires of an even length; no wrapped fence has this feature.
6. The heaviest practical wire fence made.
7. Perfectly adjustable to uneven ground.

The electric welding process used in making "PITTSBURGH PERFECT" Fencing, permits the use of heavier wire than can be used by any other fence manufacturing concern.

PITTSBURGH STEEL CO.
PITTSBURGH, PA.

"The Oliver" Line.

4-yard Contractors' Car.

Contractors' Cars

The latest "Oliver" 4 and 6-yard Contractors' Dump Cars. Angle of dump greater than that of any other car on the market.

"The Oliver" Self-Oiling Wheels

Lumber and logging cars, Rope haulage for lumber and logging tramways.

WM. J. OLIVER MFG. CO., Knoxville, Tenn.

The Gulf Coast of Texas

That's the title of a new eighty-page illustrated book just published by Rock Island-Frisco Lines.

We want a copy of it to reach the hands of every investor and homeseeker in the country.

It tells of a region unparalleled in its possibilities for home-getting and fortune-making—recently opened up by the building of the St. Louis, Brownsville & Mexico Railway.

You have heard of other sections that are or were favorable for such purposes, but you have never heard of the like of Southern Texas—MARK THESE WORDS.

The book will tell you something about it and a trip of inspection is cheaply made. Are you interested?

If you will give me your address I will promptly correspond, sending you the book and full particulars. By special arrangement you will also be personally introduced, if you desire, to FARMERS WHO ARE NOW THERE—to whom you can talk and of whom you can learn all about that new, marvelous country—the Gulf Coast of Texas.

Write me to-day. **JOHN SEBASTIAN, Passenger Traffic Manager**

Rock Island-Frisco Lines, Chicago or St. Louis

20-5t (Address me at city nearest you.)

THE PROCEEDINGS
OF
THE ENGINEERS' CLUB
OF PHILADELPHIA

Published Quarterly. A Splendid Advertising Medium

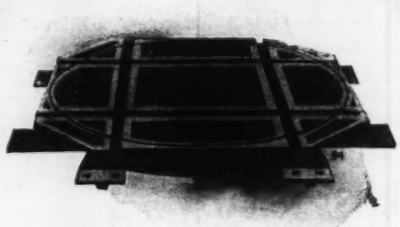
For Space and Rates address

GEORGE T. GWILLIAM, Chairman Advertising Committee — or — WALTER LORING WEBB, Secretary

1122 GIRARD STREET, PHILADELPHIA

IF ***YOU have a Friend*** not already a subscriber to the **Engineering News**, but who would be interested in receiving a ***Sample Copy***, send us his name and address on a postal card. We are always pleased to mail a copy of ***Engineering News*** free to any Engineer, Contractor or Manufacturer not so fortunate as to be already a subscriber. THE ENGINEERING NEWS PUBLISHING CO., 220 Broadway, New York.

W W



THIS TURNTABLE

is specially designed for use in boiler rooms and shops. It turns with the utmost ease, being mounted on hardened steel balls which run in a machine-turned groove It stops automatically at every quarter revolution.

OUR LONG EXPERIENCE

of over twenty years has enabled us to manufacture a line of industrial railway equipment of unsurpassed efficiency and durability. We always carry a large stock on hand at our Brooklyn, N. Y., warehouses, thereby enabling our customers to obtain prompt shipment of standard material.

Write Dept. 6 for Catalog H

RAILROAD SPECIALISTS FOR ALL INDUSTRIES
ERNST WIENER COMPANY

66 Broad Street, New York
Gazette Building, Pittsburgh
37 Farnsworth Street, Boston
Barnaby Building, Bisbee, Ariz.
WORKS: Youngstown, O.

FROGS AND SWITCHES

Also Crossings, Guards, Rails, and all track accessories for railways from 8 to 100 lbs. per yard. For Steam and Electric Railways. Mine and Industrial Track.

We design your layouts and make no charge for consulting engineering.

The Indianapolis Switch and Frog Co.
SPRINGFIELD, OHIO

ELLIS PATENT BUMPING POST

Simple, Strong and Lasting
Adapted to All Positions

The Ellis Patent Bumping Post
FOR TRESTLES
Mechanical Mfg. Co., Chicago, Ill.

CAR CAPACITY

Capacity for heavy loads.
Capacity for steady work.
Capacity for staying on the track.
Capacity for rapid and easy handling.

The chief capacity of Continental Cars is their earning capacity, which is after all, what they're built for.

It will pay you to write for a catalogue.

CONTINENTAL CAR & EQUIPMENT CO.
Works and General Offices
118 Wabasso Street, Highland Park, Louisville, Ky.

Freight Cars
OF ALL DESCRIPTIONS
Youngstown Car Mfg. Co.
Youngstown, O.

FOR SALE OR TO RENT
Hoisting Engines.
Guy and Stiff-leg Derricks.
Complete Diving Outfits.
Direct-connected Centrifugal Pumps.
Complete Stone-Crushing Plants.
Air Compressors and Pile Drivers.
MARVIN BRIGGS
1910 Whitehall Building, New York

Shovel and Dredge Repairs

We furnish Castings, Forgings, Chains and Machine Work. Will rebuild complete or furnish any part. Builders of Steam Shovels and Dredges.

The Bellefontaine Foundry & Machine Co.
BELLEFONTAINE, OHIO

LOCOMOTIVES AND CARS

Dump Cars
New and Second Hand

J. M. DOBBS, 17 Battery Place, New York
Telephone, 4058 Rector

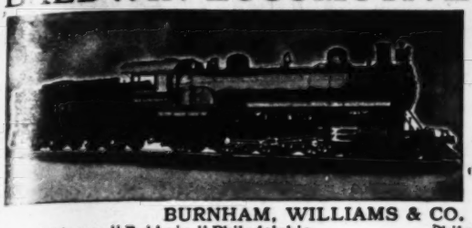
Tracklaying by Machinery

Simple—Rapid—Economical

D. F. Holman
Railway Tracklayer Company
1749 Railway Exchange, Chicago

RED CEDAR PILING, POLES and POSTS
All Lengths J. P. Meredith Cedar Co. MEMPHIS, TENN.

BALDWIN LOCOMOTIVE WORKS



Broad and Narrow Gauge

Locomotives

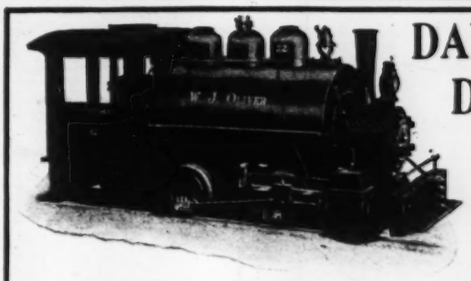
Single, Expansion and Compound

Mine, Furnace and Industrial Locomotives

Electric Locomotives with Westinghouse Motors and Electric Trucks

BURNHAM, WILLIAMS & CO.

Cable Address: "Baldwin," Philadelphia — Philadelphia, Pa., U. S. A.

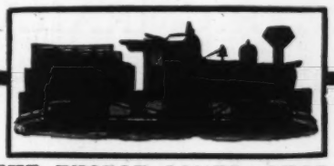


DAVENPORT DINKEYS

Are Built on Honor and Guaranteed in Every Particular.

Davenport Locomotive Works

Davenport, Iowa



THE WISEST CONTRACTORS

use the best labor-saving devices and the most modern appliances. One of the greatest helps is our famous

SADDLE TANK LOCOMOTIVES

built in a variety of types, on any reasonable gauge, varying in weight from 3 to 50 tons. They accomplish the most satisfactory work and are economical to operate; strongly built and very durable. We are also makers of the celebrated

SHAY GEARED LOCOMOTIVES

which are built for heavier work, steep grades, and uneven tracks. In weights ranging from 10 to 150 tons.

Our Catalogues Nos 13N and 14M tell all about them.

THE LIMA LOCOMOTIVE AND MACHINE COMPANY

116 West Second Street, Lima, Ohio, U. S. A.

LET US HELP YOU

settle your locomotive problems. Tell us your grade and load; we'll do the rest.

Folders on request

VULCAN IRON WORKS

Wilkes-Barre, Penna., U. S. A.

Are You in the Market? If so let ENGINEERING NEWS help you. We can help you very materially with ***no expense to either buyer or seller.*** Notice of your wants will be sent our advertisers.

This letter shows how buyers appreciate the service:

ENGINEERING NEWS PUBLISHING CO.

Gentlemen:

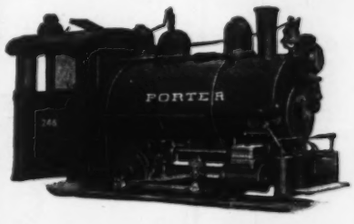
We are getting everything in the line of catalogs and general information from the several firms you mention, and certainly do not need more, for these seem to more than cover the whole ground in every line. Many thanks to you in the matter.

Yours most truly, F A. S——, Deadwood, S. D.

LIGHT LOCOMOTIVES

STEAM AND COMPRESSED AIR

All Sizes, Gauges and Designs



Our illustrated catalogue will be mailed free on application of intending purchasers.

To accommodate persons not requiring locomotives, a copy will be sent on receipt of 50 cents.

H. K. PORTER COMPANY, 531 Wood Street, Pittsburg, Pa.

THIRD EDITION OF

SMOLEY'S TABLES

GREATLY ENLARGED

Parallel Tables of Logarithms and Squares

of Feet, Inches and Fractions of an Inch from 0 to 50 feet, advancing by 1-32 of an Inch, and from 50 feet to 100 feet, advancing by 1-16 of an Inch. Angles and Logarithmic Functions Corresponding to given Bevels, and Other Tables.

By CONSTANTINE SMOLEY, C. E.

The success achieved by the previous editions of this work has encouraged us to have the Tables extended to 100 feet, thus greatly increasing the value of the book.

The Tables of Angles and Logarithmic Functions, corresponding to given bevels, inserted in this edition, has many uses such as:

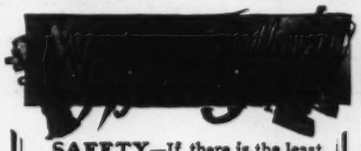
1. Offering an exact and rapid solution of a right-angle triangle when given by the bevel and one of its sides.
2. The bevel or slope can be read directly from the angle expressed in degrees, minutes, etc., or *vice-versa*.
3. The bevel can be obtained from the hypothenuse and one of the sides of the triangle without first figuring the other side by means of the table of squares.

Flexible leather, 5 x 7 inches; 331 pages, 5 sets of tables 8 pages of explanations and typical examples

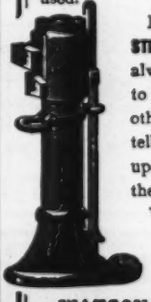
Price, $3.00, net

The Engineering News Publishing Company

220 Broadway, New York



SAFETY—If there is the least suspicion of a defect in ram, cylinder or any other part of one of our jacks that part is discarded, it cannot pass muster with us—cannot be used.



In building **WATSON-STILLMAN** Jacks we have always made it a point to consider the safety of others. One can never tell how much depends upon the reliability of the jack used.

We build nearly 300 varieties. Send for Jack List, Edition Z.

WATSON-STILLMAN CO.

Offices { 26 Cortlandt St., New York / 453 The Rookery, Chicago

CHICAGO SIGNALS

ARE IN SERVICE ON ROADS AGGREGATING

79½

PER CENT. OF THE TOTAL MILEAGE IN AMERICA

PROVING THEIR

SUPERIORITY
EFFICIENCY
DURABILITY
ECONOMY

Illustrated Catalogue Mailed on Request

THE RAILROAD SUPPLY CO.

NEW YORK — CHICAGO

Plate Steel Tool Boxes

RAIN PROOF

ALL SIZES TO ORDER

THE W. J. CLARK CO.

North Depot Street — Salem, Ohio

KING-LAWSON CAR CO.

OUR ALL-STEEL 40-TON DUMP CAR DUMPS 100 PER CENT. OF THE LOAD EITHER TO THE RIGHT OR LEFT

Our Claim is Not That No Better Car can be Made, but that it is the Best Made To-day

NEW YORK OFFICE, 17 STATE STREET — Built by Middletown Car Works, MIDDLETOWN, PA.

PRESSED STEEL CAR COMPANY

STEEL CARS

Freight, Passenger, Baggage, Postal and Street Cars
Composite Cars and Steel Underframes

TRUCKS FOR STEAM AND ELECTRIC RAILWAYS

PRESSED STEEL SPECIALTIES

OFFICES

PITTSBURG NEW YORK CHICAGO ATLANTA LONDON MEXICO CITY SYDNEY, N. S. W.

CLIMAX "CLAY" STOCK GUARDS
Have stood all Tests and their Superiority is now Conceded
THE CLIMAX STOCK GUARD Co
506 TITLE & TRUST BLDG CHICAGO, ILL.

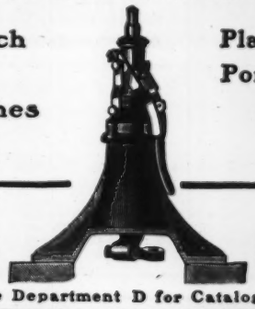
THE COST of a "WANT" Advertisement in ENGINEERING NEWS is 1½ cents a word, an insertion, for "Situations Wanted" 2 cts. a word for "Situations Open," and "Miscellaneous Wants."

THE WEIR FROG CO
Manufacturers of
Frogs Switches Crossings Rail Braces &c
CINCINNATI O.

RAMAPO IRON WORKS

Hillburn—N. Y.—Niagara Falls
Cable Address, Ramaliam
NEW YORK OFFICE, 170 BROADWAY

Safety Switch Stands
Frogs, Switches Crossings

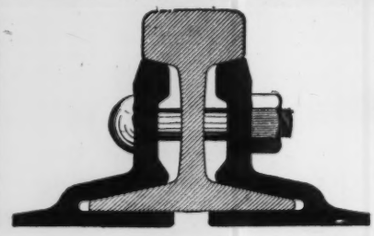


Plantation Cars
Portable Track
Switches
Curves

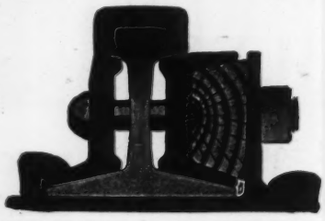
FOR Contractors AND Plantations

Write Department D for Catalogues

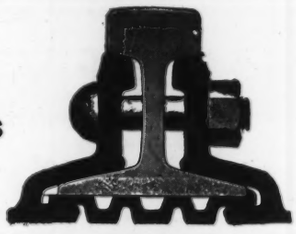
Please mention ENGINEERING NEWS.



Over 25,000 Miles in Use



All Agencies Have Catalogues



THE RAIL JOINT COMPANY

MAKERS OF

Continuous, Weber and Wolhaupter Rail Joints
Compromise and Insulating Joints

PROTECTED BY UNITED STATES PATENTS

GENERAL OFFICES
29 West 34th Street, New York City

BRANCH SELLING AGENCIES:

Atlanta, Ga., Eng. Am. Building.
Baltimore, Md., Union Trust Building.
Boston, Mass., India Building.
Chicago, Ill., Monadnock Building.
Cincinnati, O., First Nat. Bank Building.
Denver, Col., Equitable Building.
New York, N. Y., 29 W. 34th Street.
New Orleans, La., Hennen Building.
Pittsburg, Pa., Lewis Block.
Portland, Ore., Marquam Building.
Seattle, Wash., Alaska Building.
St. Louis, Mo., Commonwealth Trust Bldg.
St. Paul, Minn., Pioneer Press Building.
Troy, N. Y., Burden Avenue.

PINTSCH LIGHT

In use on 148,000 cars, 6,600 locomotives and 1,900 buoys in Europe and America. The test of experience has proven it pre-eminent in efficiency, reliability and economy.

STEAM HEAT

Jacket Systems of Hot Water Circulation, and Direct Steam Systems. Safety Straight Port Couplers. In use on 160 railroads in the United States.

THE GRAND PRIZE, ST. LOUIS

Chicago Philadelphia **SAFETY CAR HEATING & LIGHTING CO., 160 Broadway, New York** St. Louis San Francisco

THE M. C. B. ASSOCIATION recommends a KNUCKLE-OPENER

"Which will throw the knuckle completely open and operate under all conditions of wear and service."

This recommendation exactly describes the operations of the **PITT COUPLER**

With the Pitt Coupler the switchman will never be obliged to reach in—on sudden impulse—at the last moment, and when the car is in motion, to open the knuckle by hand.

The "Knuckle-Opener" in the Pitt Coupler is positive in operation and pushes the knuckle open to its fullest range of movement either from a fully closed position or from any partially open position REGARDLESS OF RUST.

Manufactured only by THE McCONWAY & TORLEY COMPANY, Pittsburgh, Pa.

Locomotives, Freight and Passenger Cars

FORNEY TYPE

to 36-Ton Std. Gage

Contractors' Locomotives, Cars, Steam Shovels

Rebuilt at our own works. **IMMEDIATE SHIPMENT**

NARROW GAUGE LOCOMOTIVES, CARS AND TRUCKS

Boarding Cars, Ballast Cars, Unloaders, Spreaders

Suburban Coaches and Locomotives

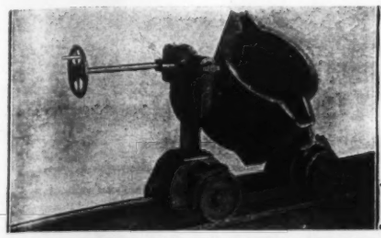
New 80,000 lb. Capacity, Flat and Gondola Cars

Rebuilt 50,000 and 60,000 lb. Capacity Flat and Gondola Cars

FITZ-HUGH, LUTHER CO., Monadnock Block, CHICAGO

141 BROADWAY NEW YORK · CHEMICAL BLDG. ST. LOUIS · 80 ST. FRANCIS XAVIER ST. MONTREAL, CAN. · RIALTO BLDG. SAN FRANCISCO

In Writing to Advertisers Please Mention ENGINEERING NEWS.



Russel Wheel and Foundry Company

(CAR DEPARTMENT)

LADLE CARS

operated by worm and gear, thus locking ladle in any desired position. Designed to **Increase Capacity & Decrease Costs**

1800 lbs. Capacity Ladle Car

Detroit, Mich.

Do Not Buy SECOND-HAND LOCOMOTIVES

They are a source of constant worry and expense. GET OUR PRICES ON NEW LOCOMOTIVES on hand, 7 x 12, 9 x 14, 10 x 16, standard and narrow gauges

DAVENPORT LOCOMOTIVE WORKS - DAVENPORT, IOWA

SMALL LOCOMOTIVES

Can make quick deliveries on locomotives suitable for contractors, Rolling Mills, Industrial Plants and general construction work.

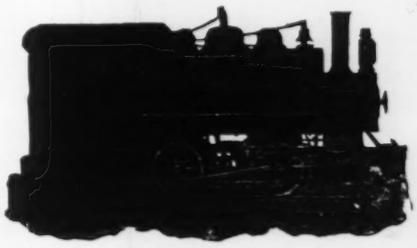
Simple Designs

Quickly Repaired

Large Water Capacity

Roomy Cabs

Spare Parts Always on Hand



AMERICAN LOCOMOTIVE COMPANY

111 BROADWAY, NEW YORK

Where to Sell Your Goods

That is the **point.**

You know how to **produce** and **how** to **sell.** At a cost of but a **few cents per day,** we will keep you informed as to **where** to sell. **That is our business**—Accomplished through our exclusive to-you SPECIAL DAILY TRADE NEWS CLIPPING SERVICE, or our REGULAR DAILY CONDENSED TRADE NEWS REPORTS.

Reading and clipping from over **50,000 publications monthly** (including every Daily and nearly every Weekly and Periodical in the U. S.)—

We supply you **every twenty-four hours** with **every item** printed **anywhere** (or covering such territory as you may desire) of interest to **you,** as opening up new possibilities of **placing your products** or of making **profitable deals** or **investments,** or of **value** in your business in **any way.**

Write for **Booklet "A,"** stating **your line**—we will tell you how we can **serve you** (sending you sample Service), and what it will **cost.**

OTHER THINGS YOU MAY WANT TO KNOW

OUR "TOPICAL SUBJECTS" SERVICE: We supply Clippings from **all publications,** covering **any subject** in which you are interested.

OUR "PERSONAL ITEM" SERVICE: We supply Clippings from **all publications,** of everything said about **yourself** or **your business.**

It's Simply a Question of HOW We Can Serve You. Ask US

International Press Clipping Bureau

126 Boyce Building Chicago, U. S. A.

Books on **LETTERING**

By C. W. REINHARDT. Price, $1.00

By Prof. H. S. JACOBY. Price, $3.00

"The 20 Century Limited"

Fastest Long-Distance Train in the World, 960 Miles in 18 Hours via the

NEW YORK CENTRAL LINES

"America's Greatest Railroad"

This magnificent train is equipped with Pullman cars of the very latest design and has all the special features which have made the New York Central service so deservedly popular. Barber, Fresh and Salt Water Baths, Valet, Ladies' Maid, Manicure, Stock and Market Reports, Telephone, Stenographer, etc.

A dozen other fast trains between

NEW YORK, BOSTON

and

BUFFALO, DETROIT

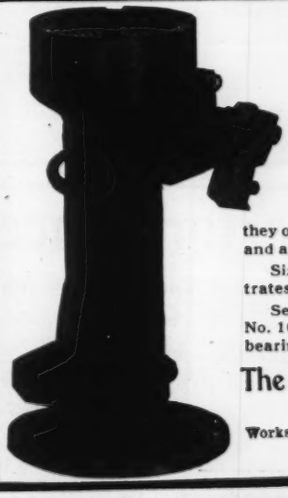
CLEVELAND, COLUMBUS

CINCINNATI, INDIANAPOLIS

CHICAGO, ST. LOUIS

The West and Southwest

C. F. DALY
Passenger Traffic Manager
New York



Safety for Man and Material

is assured by the use of

BUDA BALL-BEARING JACKS

Made of the highest grade material by experienced men. Accurately constructed, they operate with less friction than other makes, and are consequently more durable.

Sizes and styles for all uses. The cut illustrates our 50-ton ball-bearing bridge jack.

Send to our Chicago office for Jack Catalogue No. 101, fully illustrating our ball-bearing, cone-bearing, ratchet and friction jacks.

The Buda Foundry and Mfg. Co.

MAIN OFFICE, CHICAGO

Works, Harvey, Ill. St. Louis, Frisco Bldg.

New York, 26 Cortlandt St.

Please mention ENGINEERING NEWS.

THE COST OF PIPE SEWERS

(including excavation, furnishing, laying and back-filling) may be readily determined from

KIRCHOFFER'S DIAGRAM

which is based upon data obtained from several hundred bids, wherein depth of trench and size of pipe were specified.

Plate paper, price 25 cents

ENGINEERING NEWS PUBLISHING COMPANY

220 Broadway, New York

NEW YORK SWITCH & CROSSING CO.

Manufacturers, HOBOKEN, N. J.

Engineers and Contractors

Frogs, Switches, Crossings, Curves, Switch Stands, etc., Automatic Electric Switches, Hard Steel Centres a specialty

SPECIAL TRACK WORK OF EVERY DESCRIPTION

LET US SEND YOU FREE COPIES

OF OUR BOOKLETS:

"Serviceable Paints for Particular Places"

"The Best Way to Prevent Rust"

THEY OPEN THE WAY TO PAINT SATISFACTION

ADDRESS DEPT. N

DETROIT GRAPHITE MFG. CO.

DETROIT, MICH.

BUILDERS IRON FOUNDRY

PROVIDENCE, R. I.

Globe Special Castings for Water Works

The Specials are compact. They do not present the usual foot or two of straight pipe, which the purchaser obtains at double price.

ALL COMMON SIZES IN STOCK
CATALOGUE MAILED ON APPLICATION

M. J. DRUMMOND & CO., New York Sales Agents
182 Broadway, New York City 2

"Well! Above All Things!"

RUBEROID ROOFING

(TRADE-MARK REGISTERED)

Today and for thirteen years past an unequaled roofing for factories and foundries.
Heat-proof. Fume-proof.
Booklet "D."

THE STANDARD PAINT CO.
Sole Manufacturers
100 William Street, New York

When it is a question of protecting your clients' buildings from the danger of exposure to fire originating in buildings contiguous, ask us to address him some of our printed matter descriptive and illustrative of **Mississippi Wire Glass** and its performances under stress. We will act promptly.

Samples and Printed Matter, Descriptive and Illustrative, on request
MISSISSIPPI WIRE GLASS CO., 277 Broadway, New York

Locomotive Performance

The Result of a Series of Researches Conducted by the Engineering Laboratory of Purdue University

By WILLIAM F. M. GOSS, M.S., D.E.

Director of the Engineering Laboratory and Dean of the Schools of Engineering Purdue University

8vo, xvi + 439 pages, 229 figures Cloth, $5.00

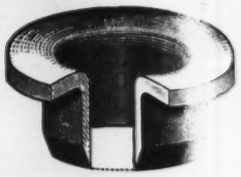
CONTENTS: Part I. Locomotive Testing; The Development of the Purdue Testing Plant; Growth of Interest in Laboratory Tests of Locomotives; Locomotive Schenectady No. 1; Method of Testing and Data. Part II. Locomotive Performance—A Typical Exhibit; Locomotive Performance as Affected by Changes in Speed and Cut-off. Part III. The Boiler; Boiler Performance; High Rates of Combustion and Boiler Efficiency; The Effect of Thick Firing on Boiler Performance; Spark Losses; Radiation Losses; The Front End; Superheating in the Smoke-box. Part IV. The Engines; Indicator Work; The Effect of Lead upon Locomotive Performance; The Effect upon Locomotive Performance of Outside Lap; The Effect upon Locomotive Performance of Inside Clearance; Locomotive Valve-gears; Action of the Counterbalance; Machine Friction. Part V. Locomotive Performance; The Effect of Throttling; Effect of High Steam Pressures on Locomotive Performance; Concerning Diameter of Driving-wheels; Atmospheric Resistance to the Motion of Railway Trains; A Generalization Concerning Locomotive Performance.

JOHN WILEY & SONS

43 and 45 East 19th Street, New York City

WEAR-WELL LEATHER PACKINGS

Made in All Sizes for



AIR HOISTS, AIR DRILLS, AIR BRAKES, HYDRAULIC JACKS

Elevators and Reduce your cost of maintenance

Special Machinery Increase the efficiency of your machines

WRITE FOR ILLUSTRATED BOOKLET AND SAMPLES

DETROIT LEATHER SPECIALTY CO., Manufacturers
900 Beecher Avenue, Detroit, Michigan

THE ROEBLING SYSTEM OF FIRE PROOFING

Send for Catalogue

The Roebling Construction Co., Fuller Bldg., Broadway and 23d St., New York

Kinnear STEEL ROLLING DOORS

Rolling Doors in Steel and Wood

For Freight Sheds, Roundhouses, Car Barns, etc.

Several different styles. We take pleasure in suggesting the best method of application. We are always the leaders in improvements, the latest and one of utmost importance, being the reciprocating shaft

JAS. G. WILSON MFG. CO.

Established 1876. Incorporated 1903

Offices in All Large Cities Chief Address, 3 West 29th Street, N. Y.

THE **Keystone Drilling Machines**

Have been on the market for 25 years

For Water Wells, Oil Wells, Placer Gold Test Holes, Lead and Zinc Prospects, Blast Holes, Bridges, Soundings, etc.

PERCUSSION COAL CORING TOOLS

Our five (5) large catalogs are practical text books on the different kinds of work for which machines are intended.

KEYSTONE DRILLER SHOPS, Beaver Falls, Pa.
New York Office, 170 Broadway

See large adv. page 20.

THE PITOMETER CO.

310 Ashland Block, Chicago **220 Broadway, New York**

Our INSTRUMENTS are well known, having been used in New York, Brooklyn, Washington, Havana, Pittsburg, Columbus, Spokane, Chicago, Cleveland, Philadelphia, and many other cities.

Unlike All Other Meters the Pitometer is Portable

Can be used on any size of water main, at any time, where a "street connection" has been once set at a cost of $25 to $30. (All instruments patented.)

THE "ONE-PIECE" TURNBUCKLE

Manufactured by
Merrill Bros., 387 East Ave., Brooklyn, N. Y.

TURNBUCKLES

Branch Office: 11 Broadway, New York
CLEVELAND CITY FORGE & IRON CO.
CLEVELAND, OHIO

ALUMINUM

The Pittsburg Reduction Co., Pittsburg, Pa.

HAULING AND LAYING WATER PIPE.

Office of Sewerage and Water Board, No. 602 Carondelet Street, New Orleans, La., Nov. 10th, 1906.

Sealed proposals will be received until 3 o'clock P. M., Wednesday, January 23d, 1907, for the hauling and laying of approximately 50 miles of cast-iron water pipe, from 4 to 42 inches in diameter, and aggregating about 13,000 tons.

A certified check on a New Orleans bank for $3,000 must be deposited with the Secretary of the Sewerage and Water Board by each bidder, not later than 2 o'clock P. M. Wednesday, January 23d, 1907.

A surety company bond for an amount equal to 25 per cent. of the gross amount of the contract will be required of the successful bidder.

Specifications, general plans and blank forms of proposal may be obtained at the office of the Board.

The right is reserved to reject any or all bids.

F. S. SHIELDS,
Secretary.

GEO. G. EARL,
20-10t General Superintendent.

RESERVOIR EMBANKMENT.

La Junta, Colo.

Sealed proposals will be received by the Secretary of the Otero Irrigation District until 11 o'clock a. m., January 22, 1907, and thereupon opened, for the construction of a reservoir embankment at Clear Creek, near Granite, Chaffee County, Colorado.

Specifications, form of contract and proposal blanks may be obtained, and plans of the work inspected at the office of the Secretary, La Junta, Colorado, and at the office of George G. Anderson, Consulting Engineer, No. 501 Equitable Building, Denver, Colorado.

Each bid shall be accompanied by a certified check for one thousand ($1,000) dollars made payable to the Secretary of the Otero Irrigation District, as a guarantee that the bidder will, within ten days of acceptance, enter into contract and furnish an acceptable bond in the sum of twenty-five thousand ($25,000) dollars for the faithful performance of the work.

Work to commence on March 1, 1907, or as soon thereafter as the weather will permit.

The right is reserved to reject any or all bids.

THE BOARD OF DIRECTORS, OTERO IRRIGATION DISTRICT,
By A. D. BEST,
President.
GEORGE A. KILGORE, Secretary. 25-3t

WATER-WORKS TUNNEL AND INLET.

Gary, Ind.

Sealed bids will be received at the office of the Engineers (1207 Hartford Bldg., Chicago) up to 11 a. m., Tuesday, January 15, 1907, for furnishing all material and constructing a water-works inlet for the town of Gary; including a six-foot tunnel in clay, approximate length 15,000 ft., one-half of which is to be located beneath the bed of Lake Michigan and the remainder beneath the land; together with shafts, intake and other appurtenances.

Plans may be examined at the office of the Engineers, and specifications obtained by addressing same.

JOHN W. ALVORD,
CHAS. B. BURDICK,
Engineers.
1207 Hartford Bldg., Chicago, Ill. 25-3t

ELECTRIC RAILWAY.

Bisbee, Ariz.

Sealed proposals will be received at the office of the Warren Company, at 2 P. M., Monday, February 4th, 1907, for the preparing of the roadbed and sub-grade of approximately five miles of electric line for the Warren Company, between Bisbee, Arizona, and Warren, Arizona.

Instructions to bidders, specifications, plans and profiles, and other necessary information, can be had upon application.

Plans, specifications and profiles will be sent to competent bidders upon receipt of twenty-five ($25.00) dollars as a guaranty for return of plans. Proposals shall be made upon blanks furnished by the Company, and shall be accompanied by a certified check or surety bond in the sum of ten per cent. of the amount of their bid.

The Warren Company reserves the right to reject any or all bids.

CLEVE W. VAN DYKE,
Manager.
Bisbee, Arizona,
December 10, 1906. 25-4t

CHARLES MILLAR & SON CO., Selling Agents, Utica, N. Y.

UTICA PIPE FOUNDRY CO.

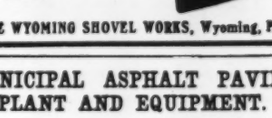
Cast Iron Pipe and Specials. Hydrants, Gates, Pig Lead, etc. Akron Sewer Pipe Lead Pipe, Plumbers' Material.

Automatic Air Lock and Siphonic Apparatus
OF EVERY DESCRIPTION
(Miller & Adams' Patents)
For Operating Bacterial Sewage Filters, Septic Tank System of Sewage Disposal
ALSO THE
Miller, Miller-Potter, Rhoads-Miller and Rhoads-Williams
AUTOMATIC SIPHONS
For Intermittent Flush Tanks—for Flushing Street Sewers
NO MOVING PARTS IN ANY OF OUR APPARATUS
Send for Illustrated Catalogue
PACIFIC FLUSH TANK COMPANY
The Temple, 184 LaSalle Street, Chicago
Eastern Agency, 42 Broadway, New York City
Canadian Agent, VICTOR HILL, C. E., P. O. Box 245, Niagara Falls, Ontario

RIVETED STEEL PIPE For Water, Gas, Sewers, Culverts, Penstocks, Air and Hydraulic Mining, Bridge Caissons, Girders, Smoke Stacks, Cupolas, Stand Pipes. TANKS
THE CARROLL-PORTER BOILER & TANK CO., PITTSBURG, PA.

THE T. A. GILLESPIE COMPANY, Engineers and Contractors
Manufacturers of Riveted Steel Pipe
PITTSBURG OFFICE, Westinghouse Building
NEW YORK OFFICE, Empire Bldg., 71 Broadway

John A. Straley
Louis B. Hasbrouck
C. Augustus Dieterich
STRALEY & HASBROUCK
Counselors at Law, Solicitors of American and Foreign Patents
PATENTS
DESIGNS, TRADEMARKS, LABELS, COPYRIGHTS and Litigation affecting the same
257 BROADWAY • • NEW YORK, N. Y.

A postal will bring gratis DATA on SHOVELS

THE WYOMING SHOVEL WORKS, Wyoming, Pa.

STANDARDS OF MATERIALS
AT LABORATORIES OF
DR. CHAS. F. McKENNA
NEW YORK CITY
Specifications, Inspection, Technology of Production

MUNICIPAL ASPHALT PAVING PLANT AND EQUIPMENT.

Toronto, Ont.

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on Tuesday, January 8th, 1907, for the supplying and erection of a Municipal Asphalt Paving Plant and Equipment for the City of Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the City Engineer, Toronto.

The usual conditions relating to tendering as prescribed by City By-laws must be strictly complied with.

The lowest or any tender not necessarily accepted.

E. COATSWORTH (Mayor),
Chairman Board of Control.
City Hall, Toronto, Canada, December 11th, 1906. 25-2t

DEPARTMENT OF THE INTERIOR, UNITED STATES GEOLOGICAL SURVEY, Reclamation Service, Washington, D. C., December 7, 1906.—Sealed proposals will be received at the office of the United States Reclamation Service, Mitchell, Nebraska, until 2 o'clock p. m., January 24, 1907, for furnishing about 125,000 pounds of steel bars for reinforcement of concrete, about 16,000 pounds of structurral steel and about 50,000 pounds of cast-iron gates, guides, stands, etc. For specifications, forms of proposal and plans, address the U. S. Reclamation Service at Washington, D. C., or at Mitchell, Nebraska. E. A. HITCHCOCK, Secretary. 24-4t

OFFICE OF THE CONSTRUCTING QUARTERMASTER, Fort Assiniboine, Montana, November 26, 1906.—Sealed proposals, in triplicate, will be received at this office until 11 o'clock a. m., December 29, 1906, and then opened in the presence of bidders, for the construction of building for shelter of wells at Fort Assiniboine, Montana, according to plans and specifications, which can be seen at this office. The United States reserves the right to reject any or all bids or any part thereof. Instructions to bidders and blank form of proposals may be obtained upon application to this office. Envelopes containing bids to be indorsed "Proposals for Providing Shelter for Wells" at Fort Assiniboine, Mont., and addressed to the undersigned. J. J. BONIFACE, Captain and Quartermaster 2d Cavalry, Constructing Quartermaster. 23-4t

WHARF.

Key West, Fla.

Sealed proposals will be received until 3 o'clock p. m., January 17, 1907, at the office of J. C. Meredith, Constructing Engineer, F. E. C. Ry., Miami, Fla., for the construction and completion of a concrete quay wall and filling involving quantities approximately as follows:

Rock excavation in slip and wall footing	76,110 c. y.
Concrete quay wall in massive blocks	26,120 c. y.
Concrete coping wall above water	1,600 c. y.
Concrete floor of wharf	2,400 c. y.
Structural steel	37,750 lbs.
Fender piles	8,200 lin. f.
Cast-iron mooring posts	31,350 lbs.
Rock filling from excavated material	102,000 c. y.

Specifications, forms of proposal and particulars may be obtained on application at the office of the Constructing Engineer where plans may be inspected.

Each bid must be accompanied by a certified check, payable to the Florida East Coast Railway Co., for 2 per cent. of the contract price, as a guarantee that the bidder will, if successful, promptly execute satisfactory contract and furnish bond in the sum of 20 per cent. of the contract price for the faithful performance of the work. The right is reserved to reject any and all bids and waive technical defects if the interests of the Railway Company require it.

Bidders are invited to be present. 23-5t

SEWERS.

Cedar Falls, Iowa.

The Sewer Committee of the City of Cedar Falls, Iowa, will receive sealed proposals up to 7.30 p. m. of January 22, 1907, for the construction of storm water sewers, approximately 3,768 feet in length, and varying from 12-in to 36-in. vitrified sewer pipe and from 42-in. to 60-in.; two-ring brick sewer. Bids to be acted upon at that time by the city council, the city reserving the right to reject any or all bids. Plans and specifications are now on file in the office of the City Clerk.

SEWER COMMITTEE OF CEDAR FALLS, IOWA. 25-2t

FURNISHING CAST IRON PIPE & SPECIAL CASTINGS.

Office of Sewerage and Water Board, No. 602 Carondelet Street, New Orleans, La., Nov. 10th, 1906.

Sealed proposals will be received until 3 o'clock P. M. of Wednesday, January 23d, 1907, for the furnishing of six lots of cast-iron pipe and special castings, aggregating approximately 38,000 tons of pipe and 1,100 tons of special castings. Pipe will be in sizes from 4 to 42 inches.

Bids will be considered upon each lot separately, or upon the first two and last four lots together or upon all lots together.

A certified check on a New Orleans bank for $1,500 must be deposited with the Secretary of the Sewerage and Water Board by each bidder and for each lot bid upon. Said checks shall be deposited not later than 2 P. M., of January 23d, 1907.

A surety company bond for an amount equal to 25 per cent. of the gross amount of any contract awarded will be required of the successful bidder in each case.

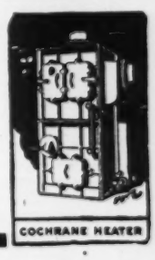
Specifications and blank forms of proposals may be obtained at the office of the Board.

The right is reserved to reject any or all bids.

F. S. SHIELDS,
Secretary.
GEO. G. EARL,
20-10t General Superintendent.

U. S. ENGINEER OFFICE, Army Bldg, New York, Dec. 6, 1906.—Sealed proposals for Dredging in Ambrose Channel, N. Y. Harbor, will be received at this office until 12 m., Jan. 8, 1907, and then publicly opened. Information furnished on application. W. L. MARSHALL, Lt.-Col., Engrs. 23-4t

U. S. ENGINEER OFFICE, Room F-7, Army Building, New York, N. Y., December 12, 1906.—Sealed proposals for removal of wreck of steamer "Governor," Rockaway Inlet, Long Island, N. Y., will be received at this office until 12 M., January 11, 1907, and then publicly opened. Information furnished on application. D. W. LOCKWOOD, Col., Engrs. 24-4t


COCHRANE HEATER

Cochrane
Feed-Water Heaters

Reduce Unit Cost of Production

The reason why the Cochrane Feed-Water Heaters have established themselves so strongly in favor with steam users generally throughout the country, is because they effect such a large saving in coal as to be distinctly noticeable in the UNIT COST of PRODUCTION. This is recognized as the true measure of economy.

Furnishing HOT-SOFT-WATER to boilers gives wonderful economic results, and we are prepared to furnish the apparatus which will give you the water in the best condition for your boilers by means of our Cochrane Feed-Water Heaters and our Sorge-Cochrane Systems of Water Purification.

The time to write for our catalogue is NOW.

Harrison Safety Boiler Works
3166 North 17th Street, Philadelphia, Pa.

For other Proposal Advertisements see pages 51 52 53 55 58 of Advertisements, and Construction News, page 224.

SEWERS.

Van Buren, Ark.

Sealed proposals for the construction of 17,600 feet of Clay Pipe Sewers for the City of Van Buren, Arkansas, will be received at the office of L. H. Southmayd, Van Buren, Arkansas, until 12 o'clock noon, Tuesday, January 22d, 1907.

Plans, specifications and approximate amount of materials, quantities and sizes of pipes and forms of proposals or further information, may be had of Theo. Hartman, Engineer in charge, 1122 Center Street, Little Rock, Arkansas; also after the 1st day of January, 1907, of L. H. Southmayd, Van Buren, Arkansas.

All bids must be accompanied by a certified check of five hundred dollars, to insure that the contractor to whom the work is awarded will enter into a contract and execute an approved bond in the sum of double the amount of the bid. The right to reject any or all bids is reserved.

Address all proposals to the undersigned Commissioners of Sewer District No. 1, Van Buren, Arkansas, and mark envelope "Proposals for Sewers."

L. H. SOUTHMAYD,
CHARLES A. PAPE,
JOHN O'KANE,
26-2t Commissioners of Sewer District No. 1.

WATER-WORKS.

Coalgate, Ind. T.

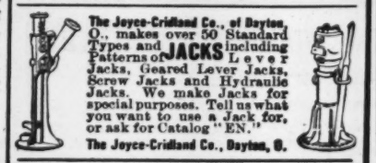
Bids will be received by the City of Coalgate, Indian Territory, on the ninth day of January, 1907, for the purchase of cast-iron pipe and specials, boilers, pumps, hydrants and valves for water-works construction. Specifications may be had by addressing O'NEIL ENGINEERING COMPANY, Dallas, Tex. 26-2t

SEWERS.

Merchantville, N. J.

Sealed proposals will be received by the Mayor and Borough Council until 3 P. M., Jan. 12, 1907, for the construction of a system of sanitary sewers. Certified check, $3,000. Plans, proposal forms, etc., at office of borough clerk and at offices of City-Wastes Disposal Co., Engr., 156 5th Ave., New York City. A. W. MacCALLUM, Chn. Sewerage Committee. 24-3t eow

THE MURRAY CO.
TENTS
59-61 West Washington St., Chicago


The Joyce-Cridland Co., of Dayton, O., makes over 50 Standard Types and Patterns of JACKS including Lever Jacks, Geared Lever Jacks, Screw Jacks and Hydraulic Jacks. We make Jacks for special purposes. Tell us what you want to use a Jack for, or ask for Catalog "EN."
The Joyce-Cridland Co., Dayton, O.

EXPANSION & TOGGLE BOLTS For fastening all kinds of material to stone and brickwork. Send for Catalogue.
Steward & Romaine Mfg. Co., 120 N. 6th St. Phila. Pa.

THE CUTLER MAILING SYSTEM
PATENTED AND AUTHORIZED
SHOULD BE SPECIFIED BY NAME WHERE A STANDARD AUTHORIZED MAIL CHUTE EQUIPMENT IS DESIRED. INSTALLED IN CONNECTION WITH THE U. S. FREE COLLECTION SERVICE ONLY BY THE SOLE MAKERS
THE CUTLER MFG. CO., Rochester, N.Y.

Engineering News
is more frequently consulted for
TECHNICAL HELP
MISCELLANEOUS WANTS
SALE OF SECOND-HAND MACHINERY AND EQUIPMENT
than any other Engineering Journal in the United States.

WE wonder how often the many contractors using Dynamite, and especially the big tunnel and subway contractors in and about New York, who are using

NATIONAL DYNAMITE

by the ton every day, stop to figure how much money the National Powder Company is saving them on their Blasting Supplies? We have no connection with the Powder Trust, which is comprised of some fifty different concerns who seemingly of course, for effect only, compete among themselves by direct from headquarters. Since we are in the field, **National Dynamite** has compelled the Trust to lower prices where they were exorbitant and to better their qualities where they were poor—a natural result of breaking the monopoly. This is the best way to show your appreciation of our good work is by sending us your orders for dynamite and all Blasting Supplies. We have agents and magazines near all important centers the country over and can assure you of honest goods and prices, and prompt, courteous treatment. Don't re-establish a powder monopoly and write to us. Get in line.

NATIONAL POWDER COMPANY
299 BROADWAY NEW YORK

Please mention ENGINEERING NEWS.

American Sewer Pipe Company
PITTSBURG, PA.
LARGEST MANUFACTURERS OF
SEWER PIPE
IN THE WORLD

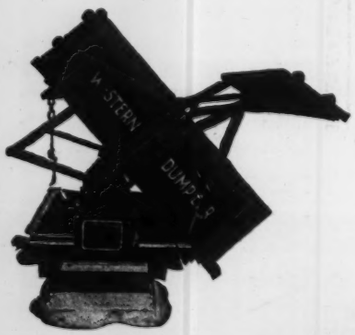
The Journal of the New England Water Works Association
For December, 1906, contains
ON THE PROTECTION OF PUBLIC WATER SUPPLIES FROM POLLUTION BY RAILROADS, with Special Reference to the Water Supply of Seattle, Washington; by Prof. William T. Sedgwick. (Included as appendixes are the Report of John W. Alvord, Consulting Engineer to the C., M. & St. P. R. R. Co., the Report of the Commission of Sanitary Experts, and the Report of John R. Freeman, Consulting Engineer to the State Board of Health.)
A STUDY OF SOME VITAL STATISTICS (CAMBRIDGE, MASS.), by L. M. Hastings, City Engineer of Cambridge.
THE NEW WATER SUPPLY OF THE CITY OF BROCKTON, MASS., by Charles R. Felton, City Engineer.
PUMPING WITHOUT AN AIR CHAMBER, by George A. Stacy.
$1.00 a copy. 715 Tremont Temple, Boston $3.00 a year.

WESTERN DUMP CARS

1¼-yd. Car.

Sharp Dumping Angle
Pivoted Automatic Side Boards
Wide Opening for Discharge
Chilled Wheels
Bronze Bearings
They stick to the track
All sizes up to 12 yds.
All gauges

Ready for loading by hand. Note the low lift for the shovelers.



WESTERN WHEELED SCRAPER COMPANY
Earth and Stone Handling Machinery
AURORA, ILLINOIS

JUST PUBLISHED
City Roads and Pavements
Suited for Cities of Moderate Size
By WILLIAM PIERSON JUDSON
Third edition, revised and brought thoroughly up-to-date
This edition has been prepared in response to the continued call for the book as a guide to the building of rural highways as well as of city pavements

SOME COMMENTS ON THE SECOND EDITION

N. Y. TRIBUNE—"The work goes into the details of street construction and maintenance, including cost and materials, and shows a comprehensive knowledge and understanding of the subject."

MUNICIPAL JOURNAL—"A handy volume of fine appearance, which will be of interest and value to municipal officials and to all who are interested in road construction."

ENGINEERING RECORD—"A book in which conciseness and accuracy of statement are materially assisted by excellent illustrations."

BUFFALO EXPRESS—"The book is of value not only to engineers and contractors, but to the layman who, because he is a taxpayer, a driver, or an official, is, or should be interested in this important subject."

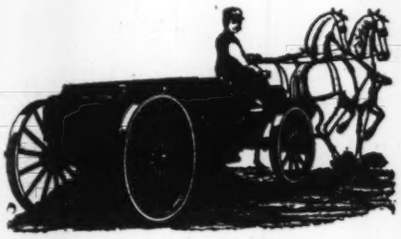
ENGINEERING MAGAZINE—"One valuable feature is a description of simple and practical cement tests which can be made by the city engineer himself, with an outfit costing not over four dollars, and which can be stored in a pigeonhole."

Descriptive Circular on Application
Cloth, 6 x 9 inches, 197 pages, 69 illustrations
Price, $2.00 net
The Engineering News Publishing Company
220 Broadway, New York

For other Proposal Advertisements see page 51, 52, 53, 55, 58, of Advertisements, and Construction News page 224.

"SCRAP HEAP" NOTIONS
in the Dumping Wagon World

The manufacturer who enters the dumping wagon field now, will of course, have to travel over the same road Mr. Watson has traveled in the past twenty years. If only he will make the "experiments" at his own expense, as Mr. Watson and the Watson Company have done, there will be no complaints from contractors.



If you could see the "scrap heap" of ideas which have been tested out in the Watson factory you would be shy of so-called improvements in dump wagons.

WATSON DUMPING WAGONS

Are not absolutely perfect, but they are just twenty years nearer perfection than the wagon that starts this year. There's a heap of "learning" to be done in this business, and Hard Knocks is the only teacher.

The new wagon will "skimp" on strength
Or, it will use steel when wood is better
Or, it will be built top-heavy and tip
There's a whole chapter to be learned about spokes
Maple won't do instead of Adirondack birch

All These Things Watson Has Learned
The Other Makers Must Learn Them
The Watson Is Not an Experiment

Better buy Watson Wagons and be "dead sure"

WATSON WAGON CO.

THE PIONEERS IN
BOTTOM DUMP WAGON CONSTRUCTION
OFFICE and FACTORY *CANASTOTA, N.Y.*

BRANCH OFFICES
256 Broadway, New York City
605 Witherspoon Building, Philadelphia, Pa.
1019 Westinghouse Building, Pittsburg, Pa.
99 Randolph Street, Chicago, Ill.

LIGHTING.

Natchez, Miss.

Bids for lighting the City of Natchez, Mississippi, for a term of ten years from March 7th, 1908, will be received up to 4 p. m., March 7th, 1907.

Specifications on file at City Clerk's office.

For further particulars address GEORGE T. EISELE, City Clerk, or S. B. STEWART, Chairman Lights and Water Committee, Natchez, Mississippi. 25-2t

Department of Public Works,
Bureau of Filtration,
Office 710 City Hall,
Philadelphia, Nov. 28, 1906.

Sealed proposals, endorsed "Bids for Pumping Engines and Coal Handling Machinery (name work bid upon)," and addressed to the undersigned, at the office above mentioned, will be received until 12 o'clock, noon, on January 4, 1907, for

Contract No. 93, Pumping Engines for Lardner's Point Pumping Station No. 3;

Contract No. 88, Coal Handling Machinery and Pockets for Torresdale Pumping Station.

Specifications, drawings and blank forms upon which bids must be made can be obtained at Room 712 City Hall, Philadelphia.

No bid will be considered unless accompanied by a certificate from the City Solicitor that the provisions of an ordinance requiring proposal bonds when the bids exceed in amount five hundred dollars, approved May 25, 1860 (p. 81, West), have been complied with.

The Director reserves to himself the right to reject any or all bids, as he may deem best for the interests of the city.

JOHN R. HATHAWAY,
23-2t—26-1t Director.

OFFICE OF THE CONSTRUCTING QUARTERMASTER, Cheyenne, Wyoming, December 14, 1906.—Sealed proposals, in triplicate, will be received at this office until 11.30 A. M., Mountain Time, January 14th, 1907, at which time they will be opened in public, for constructing, plumbing, steam heating, electric wiring and furnishing and installing electric light fixtures in the following buildings at Fort D. A. Russell, Wyoming: 4 sets of field officers' quarters, 3 double sets of captains quarters, 2 double sets of lieutenants' quarters, 1 set of quarters for 6 unmarried officers, 1 double set for N. C. officers. Two double sets field artillery barracks, or in lieu thereof: 4 single sets field artillery barracks. Four field artillery stables, 4 artillery gunsheds, 4 artillery shops and 2 artillery stable guard buildings. One veterinary hospital, 1 granary, 1 hayshed and 1 fire engine and hose cart house. Specifications and blank forms of proposals may be obtained at this office. Plans and specifications for the work specified above have been placed as follows: In office Chief Quartermaster, Chicago, Ills., St. Louis, Missouri; St. Paul, Minnesota, and Denver, Colorado. The right is reserved to reject any and all bids or parts of bids. Envelopes containing proposals should be indorsed "Proposals for constructing, etc., buildings" and addressed V. K. HART, Captain and Quartermaster, U. S. Army, in Charge of Construction, Cheyenne, Wyoming. 25-4t

Over **700** illustrations and about **800** pages gives only a slight idea of the clearness and thoroughness with which Mr. Homer A. Reid has treated his subject in

"Concrete and Reinforced Concrete Construction"

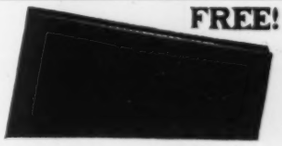
Circular giving detailed information concerning the matter in the 32 chapters of this book, and also catalogs covering all classes of books for engineers and contractors, will be mailed

FREE

THE MYRON C. CLARK PUBLISHING CO.
11-21 PARK ROW, NEW YORK

EXPANSION BOLTS
FOR
QUICK, DEPENDABLE, FASTENINGS
TO
BRICK STONE MASONRY
SAMPLES AND PRICES ON REQUEST
STAR EXPANSION BOLT CO. 147-149 CEDAR ST.
NEW YORK, N.Y.

FREE!



This Valuable Text Book

Contains formulas, facts and tables, very helpful in solving problems incident to friction transmission.

This company makes more and better

PAPER & IRON FRICTIONS AND PAPER PULLEYS

than any other concern. Let us show you how they will save you money by saving power and preventing trouble.

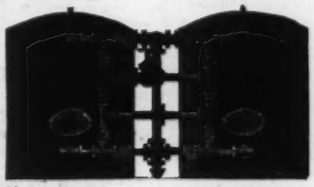
The Treatise on Friction Transmission will be sent gladly to anyone who has use for it. A postal, stating occupation and firm with which you are connected will bring it to you free.

The Rockwood Mfg. Co.
1909 English Ave.
Indianapolis, Ind., U. S. A.

PITTSBURGH FILTER MFG. CO.
PRESSURE FILTERS WATER SOFTENING PLANTS
GRAVITY FILTERS
Farmers' Bank Bldg Pittsburgh, Pa.

Water Filters
Pressure and Gravity Systems for all Purposes
MUNICIPAL PLANTS A SPECIALTY
ROBERTS MANUFACTURING COMPANY
PHILADELPHIA, PA.

THE LYNN FILTER SYSTEMS



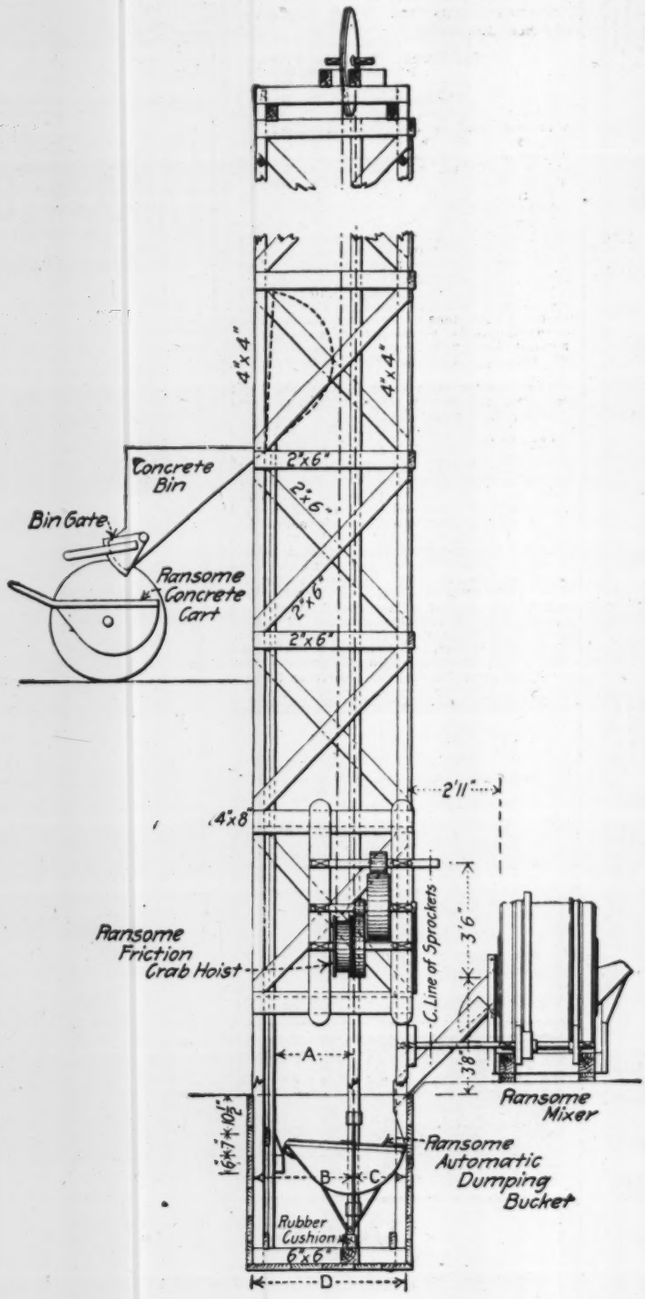
For office buildings, factories and manufacturing plants requiring pure, clear water at a low cost have a reputation for reliability. All types of filters for all requirements.

Send for Detailed Information

The Lynn Filter Mfg. Co.
Cincinnati, Ohio.

GREER FILTER COMPANY
Manufacturers of Gravity Filters, Pressure Filters, Water Softening
PERRY BUILDING, PHILADELPHIA, PA.

For other Proposal Advertisements see pages 51, 52, 53, 55, 58, of Advertisements, and Construction News page 224.



A Plant for Mixing and Hoisting Concrete

We show herewith an illustration taken from the Ransome Concrete Machinery Handbook. Plants such as these are extensively used in erecting reinforced concrete buildings. A Ransome Mixer discharges into a Ransome Automatic Dumping Bucket, which is hoisted by a Ransome Friction Crab Hoist. These Ransome Crab Hoists are driven by the same engine that runs the Ransome Mixer. The Ransome Bucket dumps automatically into a small concrete bin from which the concrete is drawn off through a Ransome Bin Gate into Ransome Concrete Carts. Send for the Ransome Concrete Machinery Handbook, which is free to all who are interested in economic methods and machinery for concrete construction.

Ransome Concrete Machinery Co.

11 Broadway, New York City

BRANCH OFFICES

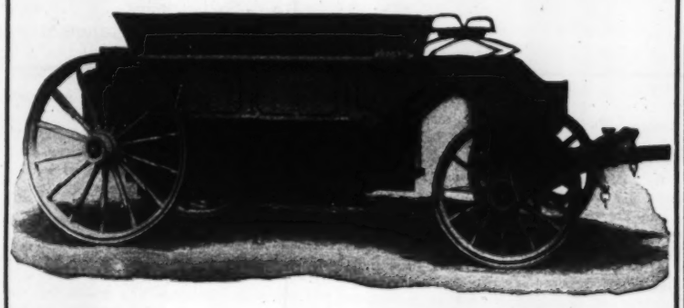
Atlas Building, San Francisco, Cal.
1015 Betz Building, Philadelphia
286 St. James Street, Montreal
1336 Monadnock Building, Chicago
6 Beacon Street, Boston, Mass.
Dispatch Building, Columbus, Ohio
404 House Building, Pittsburgh
1133 Broadway, New York
1125 Chemical Building, St. Louis
Candler Building, Atlanta, Ga.

This Border represents Ransome's Twisted Steel. Furnished in all sizes and lengths. Percentage of elongation is less than with any other form of reinforcing metal.

Using a Four-Horse Snatch-Team on a Troy

It takes a strong wagon to stand the strain when being tugged with a huge load up a rough hill by six horses—the regular pole-team assisted by a 4-horse snatch team. Did you ever see a 4-horse snatch team with all the four abreast? It is not a common sight, but since you may want to use such a team some day, we will give you a little hint on how best to do it. Of course, a very long "evener" is used, so long and so heavy that it would soon be worn out by abrasion if allowed to drag over the roadway on the return trip when not attached to the wagon tongue.

To hold this "evener" up off the ground, have your blacksmith make two short steel runners U-shaped, but with one leg of the U shorter than the other. Bolt the short leg of one U-shaped runner to the bottom of one end of the "evener;" and do the same with the other U-shaped runner at the other end of the "evener." Bolt the short leg of one U-shaped runner to the bottom of one end of the "evener;" and do the same with the other U-shaped runner at the other end of the "evener." Then your "evener" will ride along on these two runners clear of the ground, instead of dragging.



One other point: Provide short chains, or straps and fasten the ring on the "off" bit of each horse to the "nigh" bit of the next horse. Then one pair of reins will guide all four horses. But, as we said in our first sentence, it takes a thoroughly well built dump wagon to stand up under the pull of six big horses, especially when the wheels go into a chuck hole.

We risk nothing in claiming to make the strongest and most durable dump wagon made. This firm has been longer in the wagon business than any firm making dump wagons, and all its experience is bought by the purchaser of every Troy wagon. Remember that a Troy wagon will not leak a hatful of sand all day long Send for Catalog No. 2N explaining why.

The Troy Wagon Works Company

RACE AND WALNUT STREETS

TROY, OHIO

O. C. HODGES, 367 Fulton Street, Brooklyn, N. Y.

Sales Agent for Eastern New York, New Jersey and New England

Telephone, 4880 Main WAGONS IN STOCK

THE NEW WAY

Which is Revolutionizing the Reclamation of Swamp and Arid Lands.

The Austin Drainage Excavator

Constructs a ditch at a single operation perfectly true to grade, of practically any desired depth, width of bottom or width of top, and slopes the sides to any angle.

It shaves out the ditch from the virgin strata of the earth, leaving the banks as firm as nature made them.

Wide *berms* are produced, effectually preventing the waste banks from being returned to the ditch through the action of frost or erosion.

It produces a ditch which *keeps* its shape and becomes a *permanent* waterway.

Write for Catalogue No. C.

F. C. AUSTIN DRAINAGE EXCAVATOR COMPANY

New York Office, 150 Nassau St. General Offices, Railway Exchange, Chicago, U. S. A.

SEWER.

Bisbee, Ariz.

Sealed proposals will be received at the office of the Warren Company for the construction of a water system, a sewerage system, and a sewage disposal plant, until 2 o'clock P. M., Tuesday, January 15th, 1907. Instructions to bidders, proposals, plans, specifications, approximate quantities and such other information as is necessary to the bidder may be had upon application, or seen at the offices of the Engineering News, New York City, New York, or at the office of the Engineer, Patchogue, L. I., N. Y. Plans and specifications will be sent to competent bidders upon receipt of a certified check in the sum of twenty-five dollars ($25.00), as a guarantee for the return of the plans. Proposals shall be made upon blanks furnished by the company, and shall be accompanied by a certified check or a surety bond in the sum of 10 per cent. of the amount of their bid.

The Warren Company reserves the right to reject any and all bids.

CLEVE W. VAN DYKE, Manager,
Bisbee, Arizona.

A. R. APPLEGARTH, Engineer.
December 1st, 1906. 24-4t

SEWER.

Wichita, Kansas.

Sealed proposals will be received at this office until five o'clock p. m., January 21, 1907, for the construction of the Wichita Storm Water Sewer, No. 5. The approximate amount of labor and material necessary for the construction of the above sewer will be mailed to bidders on application to this office. The estimated cost of the above sewer is $318,000.00. All work necessary for the construction of the above sewer to be done under the direction and supervision of the City Engineer of the City of Wichita and according to plans and specifications on file in his office. Bidders will be required to enclose certified check in the sum equal to five per cent. of the amount bid, as a guarantee of good faith. Bidders will be allowed to bid on the entire system or any part thereof. The Mayor and Council reserve the right to reject any and all bids.

R. N. DORR,
24-3t City Clerk.

CEMENT, ENGINES, PIPE.

Ada, Ind. T.

Bids will be received by Hon. A. P. Wood, Mayor, Ada, Ind. T., and publicly opened on the 28th day of December, A. D. 1906, for the purchase by said city of Portland cement, electrically operated pumping engines, valves and sluice gates, and 8,000 feet each of eight and ten-inch water pipe. Specifications may be had by addressing O'NEIL ENGINEERING COMPANY, Dallas, Texas. 25-2t

FORT MONROE, VA., Nov. 28, 1906.—Sealed proposals, in triplicate, for the construction of a 50,000-gallon steel water tank at Ft. Monroe, Va., will be received at the office of the Constructing Quartermaster until noon Dec. 31, 1906. The United States reserves the right to accept or reject any or all proposals or any part thereof. Bidders must state name of manufacturer they propose to purchase material from. Information furnished on application. Bids should be plainly marked as such on the outside wrappers or envelope. Address CAPTAIN R. H. C. KELTON, Q. M. 23-4t

PROPOSALS FOR DUMP SCOWS.—U. S. Engineer Office, 813 Prospect Ave., S. E., Cleveland, Ohio, Dec. 21, 1906.—Sealed proposals for Two Steel Dump Scows will be received at this office until 2 p. m., Standard Time, January 21, 1907, and then publicly opened. Information furnished on application. C. McD. TOWNSEND, Major, Corps of Engineers, U. S. A. 25-4t

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., Nov. 15, 1906.—Sealed proposals will be received at the office of the United States Reclamation Service, Mitchell, Nebraska, until 2 o'clock p. m., Jan. 9, 1907, for the construction of a diversion dam and headworks involving the excavation of about 90,000 yds. of earth and rock, furnishing and placing in structures about 10,000 ft. B. M. of lumber, and the construction of about 8,000 cu. yds. of concrete masonry in connection with the North Platte Project, Nebraska. Particulars may be obtained from the Chief Engineer, United States Reclamation Service, Washington, D. C., or from John E. Field, Project Engineer, Mitchell, Nebraska. E. A. HITCHCOCK, Secretary. 21-7t

Coal-tar roofs are monuments to "penny wisdom." Use natural asphalt.

Coal-tar doesn't last. It is robbed of its valuable oils for other products before it is sold for roofs. This leaves it unable to resist the disintegrating forces of sun, air, heat and cold, so it cracks, crumbles, breaks and leaks.

Natural asphalt is lively, elastic, resisting, and lasts for years.

Our experience in roof-construction and the use of natural asphalt enables us to build Genasco—a roof that is practically everlasting, always waterproof, and unaffected by steam, gases, acids and alkalies.

The first cost of asphalt slightly exceeds the cost of coal-tar, but asphalt is infinitely more economical in the end.

The asphalt we use is supplied by the Barber Asphalt Paving Company, from Trinidad Pitch Lake, and we both guarantee Genasco roofs.

Write for list of large buildings roofed by us.

THE GENASCO ROOFING COMPANY

PHILADELPHIA

New York Chicago

Offices in principal cities

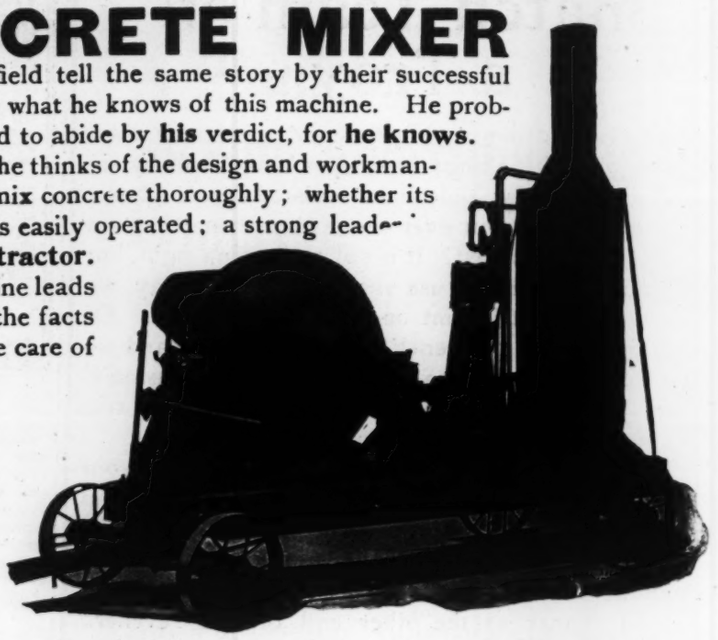
For other Proposal Advertisements see pages 51, 52, 53, 55, 58, of Advertisements, and Construction News page 224.

WE HAVE 2,000 PROOFS

that the man who buys a **SMITH CONCRETE MIXER** is well pleased. Two thousand machines in the field tell the same story by their successful operation. Ask some reliable contractor near you what he knows of this machine. He probably owns a Smith Mixer. If so, we shall be pleased to abide by **his** verdict, for **he knows.**

Ask him whether the machine is durable, what he thinks of the design and workmanship. Find out whether this machine **ever** fails to mix concrete thoroughly; whether its proven capacity fulfills our **guarantees**; whether it is easily operated; a strong leader the number sold; and a **money saver to the contractor.**

You know a **thorough knowledge** of any machine leads to a **correct judgment** concerning it. If you get the facts **regarding** the Smith Mixer, the argument will take care of itself. Send for a catalogue. Inquire prices.



Contractors Supply and Equipment Co.

Main Office, 520 Old Colony Building Chicago, Ill.

ATLANTA, W. E. Austin & Co., 1333 Candler Bldg.
BOSTON, Harold L. Bond & Co., 140 Pearl St.
CINCINNATI, Queen City Supply Co., 205 West Pearl St.
CLEVELAND, W. M. Pattison Supply Co., 197 St. Clair Ave. N. E.
DENVER, S. G. Shaw & Co., 1721 Arapahoe St.
KANSAS CITY, Bunting-Stone Hardware Co., 804 Walnut St.
NEW YORK, **Contractors Supply and Equipment Co., 170 B'dway.**
PITTSBURG, John L. Kirk, 204 Ferguson Bldg.
ST. LOUIS, J. Power Hely, 900 Wainwright Bldg.
ST. PAUL, G. E. Ingersoll, 201 German-American National Bank Bldg.
SALT LAKE CITY, S. G. Shaw & Co., 310 Atlas Bldg.
SAN FRANCISCO, Henshaw, Bulkley & Co., 221 Spear St.
SEATTLE, Caldwell Brothers, 115 Jackson St.
MONTREAL, CANADA, W. H. C. Mussen & Co., 299 St. James St.

WATER PIPE.

Winnipeg, Man.

Sealed Tenders addressed to the Chairman of the Fire, Water and Light Committee for the supply of 30 miles of assorted water pipe and quantity of specials for the City Water Works, will be received at the office of the undersigned up to 2.30 p. m. on Friday, March 1, 1906.

Specifications and forms of tender may be obtained at the office of H. N. Ruttan, City Engineer, Winnipeg, Man.

Each tender must be accompanied by an accepted cheque or draft payable to the order of the City Treasurer, or cash deposit for the sum called for in the form of tender supplied, which will be subject to forfeiture in case of failure on the part of the contractor to enter into a written contract with approved sureties if called upon to do so.

The city reserves the right to reject any or all tenders or to accept any bid which appears advantageous to the City of Winnipeg.

C. J. BROWN,
City Clerk.

City Clerk's Office, Winnipeg, December 8, 1906.

PAVING.

Norfolk, Va.

Sealed proposals will be received at this office until 12 o'clock, noon, on the 10th day of January, 1907, for the improvement of a part of Colonial Ave. and Jamestown Ave. in the City of Norfolk, Virginia, and will be then and there publicly opened and read.

An approximate schedule of the work to be done is shown on the blank form of proposal attached to the specifications which may be obtained on application to this office.

Bids must be made out in full on the blank form of proposal attached to the specification and must be enclosed in a sealed envelope, addressed to H. B. Goodridge, Chairman of the Boulevard Commission, Norfolk, Va.

Bids will be received for the following classes of pavement:

1st. For asphalt paving on a concrete base per square yard.

2d. For bitulithic paving on a concrete base per square yard.

3d. For granite curbing per lineal foot.

A certified check on some local bank must accompany each bid to the amount and under the conditions expressed in the blank form of proposal.

A surety company bond in the amount named in the specifications will be required.

The right to reject any and all bids is reserved by the Boulevard Commission.

(Signed) W. T. BROOKE,
City Engineer for the Boulevard Commission.
Norfolk, Va., Dec. 17, 1906. 25-3t

PAVING.

Norfolk, Va.

Sealed proposals, addressed to "H. B. Goodridge, Chairman of the Boulevard Commission," and endorsed "Proposals for building a macadam roadway on Colley Ave., Norfolk, Va.," will be received at this office until 12 o'clock, noon, on the 10th day of January, 1907, and at that time and place will be publicly opened and read.

Specifications for the work, including engineer's estimate, instructions to contractors, and form of contract can be had on application, and plans of the work can be seen at this office.

Bids must be made on the blank forms attached to the specifications, and must give prices proposed in both writing and figures.

Each bid must be accompanied by a certified check in the sum, and under the conditions named in the blank form of proposal.

A surety company bond in the amount named in the specifications will be required.

The right to reject any and all bids is reserved by the Boulevard Commission.

(Signed) W. T. BROOKE,
City Engineer for the Boulevard Commission.
Norfolk, Va., Dec. 17, 1906. 25-3t

AMERICA'S MOST POPULAR RAILWAY
CHICAGO AND ALTON
PERFECT PASSENGER SERVICE

BETWEEN

CHICAGO — KANSAS CITY.
CHICAGO — ST. LOUIS.
CHICAGO — PEORIA.
ST. LOUIS — KANSAS CITY.

THROUGH PULLMAN SERVICE BETWEEN CHICAGO AND

HOT SPRINGS, ARK. DENVER
TEXAS FLORIDA UTAH
CALIFORNIA OREGON

IF YOU ARE CONTEMPLATING A TRIP, ANY PORTION OF WHICH CAN BE MADE OVER THE CHICAGO & ALTON, IT WILL PAY YOU TO WRITE TO THE UNDERSIGNED FOR RATES, MAPS, TIME-TABLES, ETC.

GEO. J. CHARLTON,
GENERAL PASSENGER AGENT,
CHICAGO, ILL.

NOW READY

RAILROAD CURVE TABLES

By R. S. HENDERSON,
Author of Henderson's Earthwork Tables.

Containing a comprehensive table of functions of a one-degree curve, with correction quantities giving exact values for any degree of curve; also trigonometric tables and formulas, and a method of finding any function of a curve of any degree or radius without a field book.

The plates from which this work has been printed are photo-reproductions from the author's original tracings. The use of this process eliminates all possibility of typographical errors, and its economy enables the publishers to offer the book at the following prices:

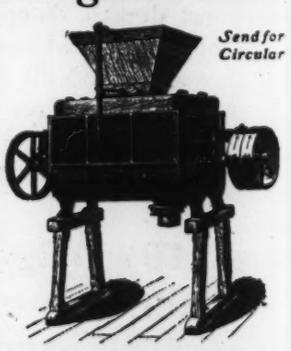
Handbook size (5 x 7 ins.), 69 pages, 10 diagrams. Cloth..... $1.00 net
Flexible leather..... 1.50 net

SEND FOR DESCRIPTIVE CIRCULAR.

ENGINEERING NEWS PUBLISHING CO., 220 Broadway, New York

The...
Broughton Mixer

Send for Circular



For Cement Manufacturers' Use

Mixes all Dry Powdered Material

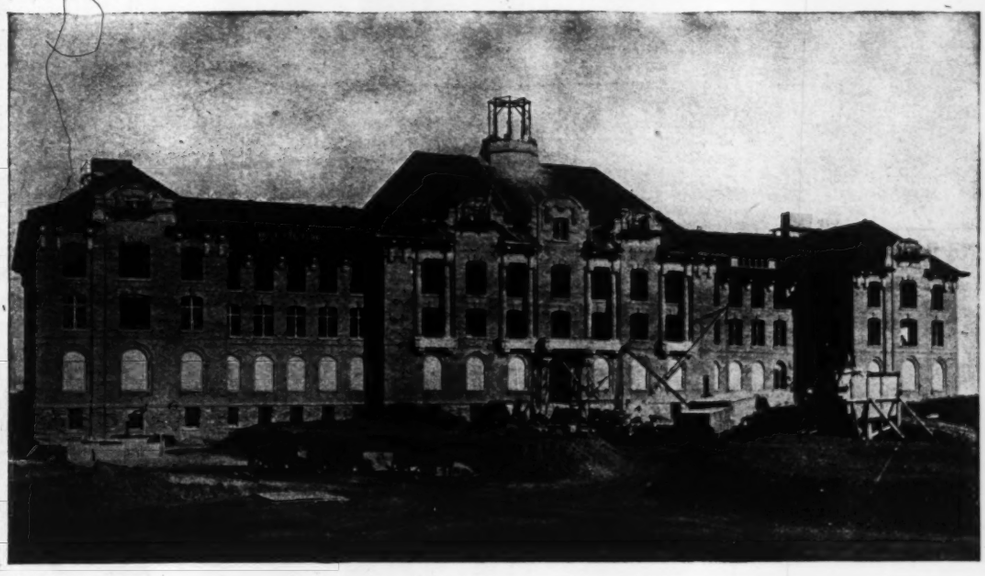
ALEXANDER IRON WORKS

SYRACUSE, N. Y.

For other Proposal Advertisements see pages 51, 52, 53, 55, 58, of Advertisements, and Construction News page 224.

Floors

Roofs



MAIN BUILDING OF THE AGRICULTURAL COLLEGE AT STE. ANNE'S DE BELLEVUE, QUEBEC

This building, together with the others comprising the College, is being erected by Sir William MacDonald, and will be donated to the Dominion of Canada.

HUTCHISON & WOOD
Architects, Montreal

CLINTON FIRE PROOFING COMPANY OF CANADA
Contractors for Fire Proofing

AREA OF FLOORS AND ROOFS

1,090,000 Square Feet

CLINTON FIRE PROOFING SYSTEM USED THROUGHOUT

The System with the Continuous Bond

SYSTEM C, TYPE I

Write for New Catalog of the Clinton Fireproofing System

CLINTON WIRE CLOTH COMPANY
CLINTON, MASS.

The border surrounding this ad is a photographic reproduction of a section of Clinton Electrically Welded Fabric. Sweet's Index, pages 96 to 103, describes the Clinton Fireproofing System.

Ceilings

FIREPROOFING DEPARTMENT
ALBERT OLIVER
1 MADISON AVENUE, NEW YORK

Seattle: L. A. Norris, 909 Alaska Building
St. Louis: Hunkins-Willis Lime & Cement Co., South End 18th Street Bridge
Baltimore: George T. Welsh, Calvert Building
San Francisco: L. A. Norris, 835 Monadnock Building

Partitions

HARBISON-WALKER REFRACTORIES CO.
PITTSBURGH, PA.
Manufacturers of Highest Grade Refractories.
Importers of Chrome Ore.
Sole Agents for Carl Spaeter Magnesite.
Fire Clay, Silica, Magnesia, Chrome BRICK.
Rotary Cement Kiln Linings.
Boiler Settings.
Mill, Forge and Heating Furnace Brick.
Locomotive Tile.
Setting Shapes for Gas Benches, etc.
7,500 Regular Customers. *Write for Booklet E.* 1,100,000 Daily Capacity.

POWER-HOUSE AND RACE.

Nanticoke, Pa.

Proposals will be received by the American Pipe Mfg. Company, 112 N. Broad St., Philadelphia, Pa., until January 15th, 1907, for the construction of a power-house, head and tail race, etc., at Nanticoke, Pa. The right is reserved to reject any or all bids or to accept whichever bid that will be to their interest. 25-2t

SEWER SYSTEM.

Cape Girardeau, Mo.

Sealed proposals for furnishing material and constructing a complete system of sewerage in Sewer District Number One, City of Cape Girardeau, in accordance with the plans and specifications and Ordinance No. 738 of said city, providing for constructing said system, will be received by the City Council of the City of Cape Girardeau, Missouri, until 8 o'clock p. m., Monday, February 4th, 1907.

The work comprises about twelve miles of pipe sewers, eight to twenty-two inches in diameter, together with all necessary appurtenances.

Plans and specifications are now on file with the City Clerk at Cape Girardeau, Mo., and at the office of the engineer, Nashville, Tennessee, and at the offices of Engineering News, New York, Engineering Record, New York, American Contractor, Chicago, and Construction News, Chicago.

Printed specifications may be obtained by addressing Geo. E. Chappell, City Clerk, Cape Girardeau, Mo.

A certified check for $1,000 will be required with each bid for the construction of said sewers.

The right is reserved to reject any and all bids.

WILLIAM H. COERVER,
Mayor.
GEO. E. CHAPPELL,
City Clerk.
GRANBERY JACKSON, C. E.,
Engineer, Nashville, Tenn.
Cape Girardeau, Mo., December 5th, 1906.
25-2t

WEST POINT, N. Y., December 15, 1906.—Sealed proposals, in triplicate, will be received here until 12 o'clock noon, January 5, 1907, for the construction of an electrical subway system, as per drawings and specifications in this office. The U. S. reserves the right to accept or reject any or all proposals or any part thereof. Forms and specifications furnished upon application. Address QUARTERMASTER, West Point, N. Y. 25-3t

The Only Successful Sewer Excavator Adapted for All Kinds of Digging

Many manufacturers have attempted to make a machine adapted for the difficult work of sewer digging, but, giving them due credit, it may be said that the only machine for this purpose which is a commercial success adapted for all kinds of digging, and regarded by contractors as a money saving invention, is the

Chicago Sewer Excavator

The small size Chicago Sewer Excavator does the work of from 75 to 150 men; the large size from 100 to 200 men.

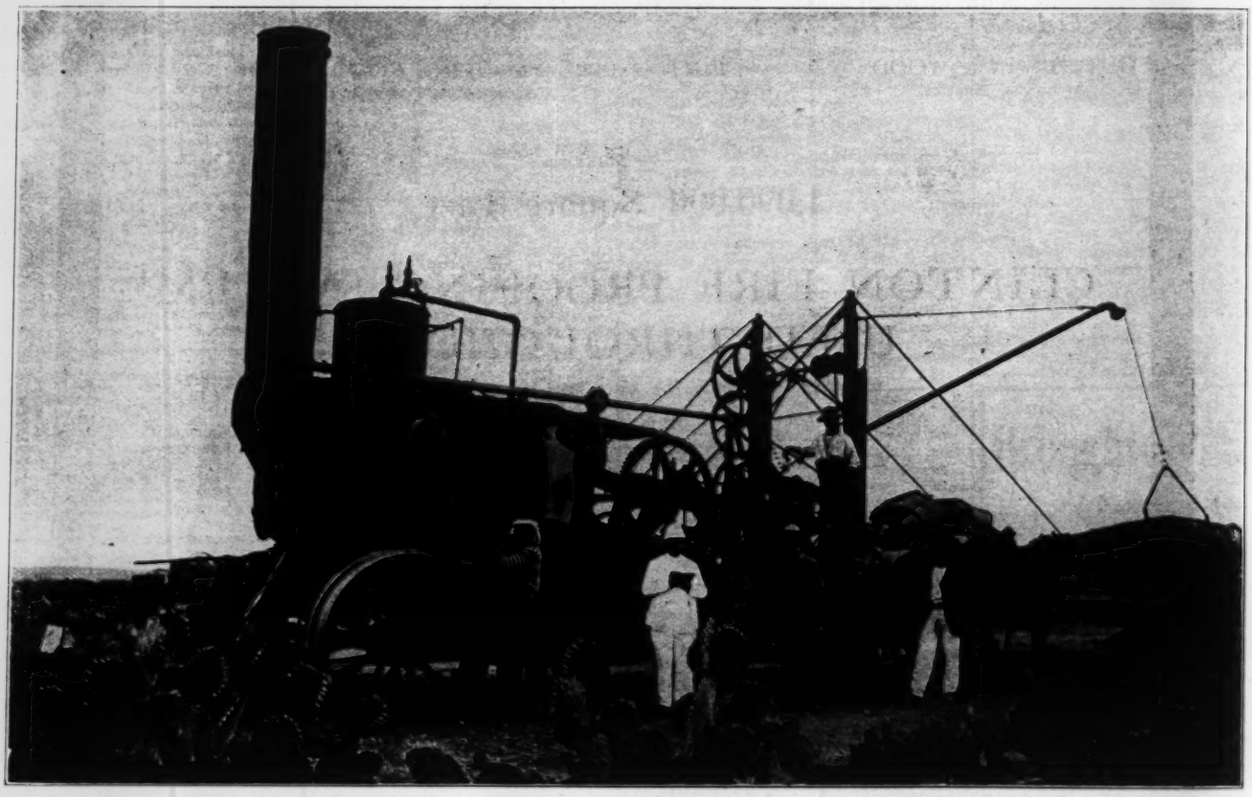
The machines dig trenches from 14 inches to 60 inches in width and up to 20 feet in depth at a single cut.

One of Many Endorsements

BUFFALO, N. Y., Aug. 13, 1906.
MUNICIPAL ENGINEERING & CONTRACTING CO.,
609 Railway Exchange Bldg., Chicago.
Gentlemen:—Machine is doing fine work. In fact, more than you claim for it, and we are unable to get enough masons to keep up with it. Have just secured an extension of nearly four thousand feet on our work and hope to be able to keep the machine right at work for the rest of the year.
Yours truly,
MILLER & FRANKLIN.

Write for Catalogue No. 102,

MUNICIPAL ENGINEERING & CONTRACTING COMPANY
New York Office, 150 Nassau St. General Offices, Railway Exchange, Chicago, U. S. A.



BUCKEYE TRACTION DITCHER

CUTTING A WATER TRENCH, 42 INCHES BY 7½ FEET, IN TUNIS, AFRICA, EIGHTY MILES FROM THE COAST

CATALOGUES ON APPLICATION

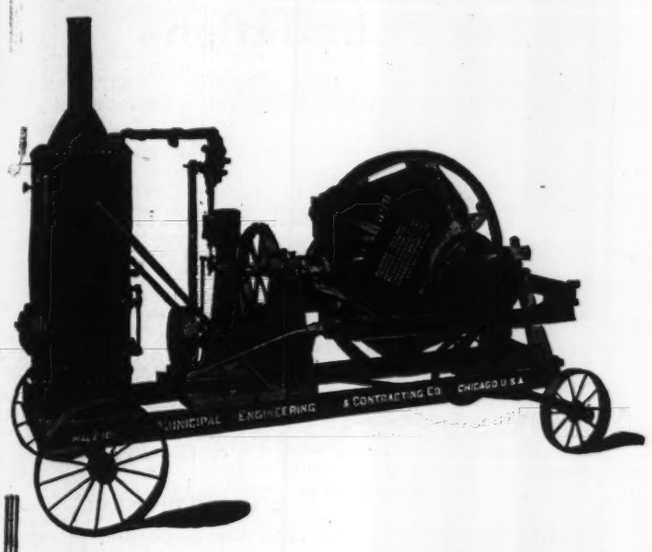
BUCKEYE TRACTION DITCHER CO. - Findlay, Ohio, U. S. A.

For other Proposal Advertisements see pages 51, 52, 53, 55, 58, of Advertisements, and Construction News page 224.

The Only Mixer in Which All the Contents of the Mixing Chamber are Mixing All the Time is the Cube

The highest developed type of the cube principle of mixing is the Chicago Improved Cube with rounded edges and corners, having breaker rods connecting the centers of adjacent sides and containing no **obstructions** in the mixing chamber.

At **15** revolutions a minute the entire contents of the cube are thrown back and forth and broken over the breaker rods **90** times, receiving the greatest possible **longitudinal** movement and **grinding** the aggregates into the voids more thoroughly than is possible in any other method of mixing.



It is obvious that in a mixer, having any form of blades, shelves, scoops or paddles as mixing devices, that each blade or scoop acts as a **bucket** and will **pocket** as much as it will hold in one **solid unmixed** mass for at least one half revolution of the drum or possibly until the batch is discharged, **delaying** the mixing operation and producing an **imperfectly mixed, streaky product.**

One half the mixing time is **lost,** the material **adheres** to these devices and produces **balls** in the concrete.

PROOF OF THE SUPERIORITY OF THE CUBE

Take the smallest size of the Chicago Improved Cube and make an **experimental test.** Make a sample batch consisting of **2** cu. ft. of sand, **1-2** sack of cement and **325** cu. in. of water and give the cube **16** revolutions, then add **4** lbs. of red oxide of iron and revolve **16** times more. Discharge the batch and make into blocks. Steam a block for **12** hours and you will find that every particle of sand is **evenly** colored. Break the block and it will be found to be colored **throughout** identically like the surface.

Now, take the same size batch, treat it in precisely the same manner, make into blocks, and steam exactly as before, but do the mixing in some form of batch mixer having any form of **blades, scoops, paddles** or **shelves** as mixing devices, or in a continuous mixer employing **conveyors** or **deflectors** as a means of mixing the ingredients. If a fair test is made, in every instance, the surface of the block will be found to be **laminated** or **spotted** in coloring. Break the block and the **same** appearance will prevail throughout.

This is a positive proof that the ingredients were not evenly mixed in any mixer but the **"Cube,"** and it is therefore a demontrated fact that none but the **"Cube"** does or can produce a **perfect** product.

The most rapid mixing of which there is record in the engineering journals was performed by the Chicago Improved Cube Mixer.

Write for Catalogue No. 2.

MUNICIPAL ENGINEERING & CONTRACTING COMPANY

New York Office, 150 Nassau Street
New England Agents, The Dyer Supply Company
7 Sudbury Street, Boston

General Offices, RAILWAY EXCHANGE
CHICAGO, U. S. A.

Eureka Concrete Mixer

Write for Catalog H

Mixing of concrete by hand a thing of the past. Save money and buy the Eureka Mixer. Automatically proportions the material from one and one to one and eight. Measures crushed stone or gravel.

EUREKA MACHINE COMPANY, 426 N. Jackson St., Jackson, Mich.

"SOLVAY" CALCIUM CHLORIDE

Retards the setting of Portland cement. Prevents the freezing of cement mortar and concrete. Thaws the ground for excavation work.
FURNISHED in CONVENIENT FORMS for CEMENT MAKERS' and CONTRACTORS' USE
For Bulletins No. 16 and 25, address
CARBONDALE CHEMICAL CO., Carbondale, Pa.

Export Catalogs Wanted Now

The San Francisco FIRE destroyed the catalog library of the AMERICAN-ASIATIC Journal of Commerce.

EXPORTERS ARE REQUESTED

to send their catalogs to this office for reference. This library is constantly referred to by travellers from Oriental and Australasian points, and is of great service to the manufacturer and to the foreign buyer who visits the United States.
There is no charge for this service to either buyer or seller. Address

AMERICAN-ASIATIC Journal of Commerce, ALPHA BUILDING, 24 DRUMM ST. SAN FRANCISCO, CAL.

IF *YOU have a Friend* not already a subscriber to the **Engineering News,** but who would be interested in receiving a *Sample Copy,* send us his name and address on a postal card. We are always pleased to mail a copy of *Engineering News* free to any Engineer, Contractor or Manufacturer not so fortunate as to be already a subscriber. THE ENGINEERING NEWS PUBLISHING CO., 220 Broadway, New York.

Foote Concrete Mixer

Automatic Measurement — Continuous Mixing
Especially Adapted for Street Paving — Most Available for Any Work
Write for the Catalogue
THE W. H. WILCOX CO., Binghamton, N. Y.

Please mention ENGINEERING NEWS.

Half of the Portland Cement Plants

in the United States and Canada

USE SMIDTH MACHINERY

Kominuters *for Granulating* **Tube Mills** *for Pulverizing*

F. L. SMIDTH & CO., 41 Cortlandt St., New York

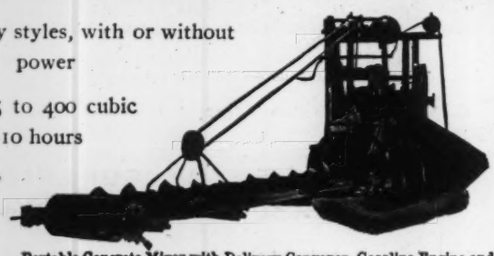
SAYLOR'S PORTLAND CEMENT Oldest American Cement
COPLAY CEMENT MFG. CO.
Pennsylvania Bldg., Phila.

Drake Concrete Mixers

Made in thirty styles, with or without power

Capacities, 25 to 400 cubic yards—10 hours

Catalogue "E" on request



Portable Concrete Mixer with Delivery Conveyor, Gasoline Engine and Special Loading Device.

DRAKE STANDARD MACHINE WORKS
Office and Salesroom: 298-300-302 W. Jackson Boulevard, Chicago, Ill.
Branch Works: St. Lawrence Supply Company, Ltd., Montreal, Can.

McKelvey Concrete Mixers

BEFORE PLACING YOUR ORDER INVESTIGATE THE MERITS OF THE

McKelvey Batch Mixer

More Points of Excellence than any Other — Headquarters for Concrete Mixers

McKELVEY CONCRETE MACHINE CO.
171 La Salle Street, Chicago, Ill., and 1215 Filbert Street, Philadelphia, Pa.
AGENTS—Good Roads Machinery Co., 136 Liberty Street, New York. Perrin, Seamans & Co., 57 Oliver Street, Boston. Emmet Jones, 329 Market Street, San Francisco. J. Jacob Shannon & Co., 1744 Market Street, Philadelphia, Pa.

IMPROVED UTICA HYDRAULIC CEMENT
The finest ground and highest grade Natural Cement manufactured in the U. S. Every car tested by Robt. W. Hunt & Co., and their test furnished on every car shipped.
MEACHAM & WRIGHT COMPANY, Sales Agents, Chicago

PORTLAND PENN-ALLEN CEMENT CO.
Guaranteed First Quality
Send for Pamphlet
Commonwealth Building ALLENTOWN, PENNA.

NAZARETH SOVEREIGN ROYAL
AMERICAN PORTLAND CEMENTS
"LIMOID" WARNER'S IMPROVED HYDRAULIC LIME PLASTER, SEWER PIPE, FIRE BRICK, "LIMOID"
WARNER'S CEMENT WALL PLASTER.
WILMINGTON, DELAWARE. CHARLES WARNER COMPANY, PHILADELPHIA, PA. LAND TITLE BUILDING

ALPHA PORTLAND CEMENT COMPANY — ALPHA PORTLAND CEMENT — MANUFACTURERS
ALPHA PORTLAND
The Recognized Standard American Brand
On the market for the past ten years. One brand only manufactured—a strictly straight Portland which in uniformity and general excellence cannot be equaled.
ALPHA PORTLAND CEMENT CO.
General Office, EASTON, PA. Works, ALPHA, NEW JERSEY

DRYERS
OF EVERY TYPE
CONSTRUCTED FOR ALL PURPOSES.
AGENTS FOR BISHOP WATER JACKETED FURNACE FRONTS.
UNITED STATES DRYING ENGINEERING CO.
66-70 BEAVER ST., NEW YORK, U.S.A.

ROTARY DRYERS
WE MAKE THE LARGEST VARIETY IN THE WORLD. MORE THAN 200 NOW IN USE
NOW USED IN THE GOV. COAL TESTING PLANT. GOLD MEDAL AT ST. LOUIS
THE C. O. BARTLETT & SNOW CO. CLEVELAND, OHIO U.S.A.

DEXTER PORTLAND CEMENT
THE HIGHEST STANDARD ATTAINABLE
Sole Agents SAMUEL H. FRENCH & CO. Philadelphia

Use Louisville Hydraulic Cement For Foundations

and invest the amount saved thereby otherwise. Concrete made of Louisville Cement is strong enough for foundations of all kinds, and by the use of it a great saving is effected. The following letter from a well-known firm of Chicago architects written when Louisville Cement was not ground so fine as it is to-day, shows its good quality and suitability for foundations.

CHICAGO, September 29, 1898.

MR. A. L. KANAGY,
Care of WESTERN CEMENT CO., Chicago.

DEAR SIR:—

In reply to your question concerning the concrete foundations of the power house of the South Side Elevated Railway Co., at 40th and State Streets, Chicago, which foundations were made of Louisville Cement, we beg to say that the foundations have turned out to be perfectly satisfactory, and behaved all the time as we expected they would.

The controversy which arose at one time concerning this was caused by no fault of the concrete or of the cement.

It is true that one of the engines was wrecked and twisted off the foundation bolts without doing any injury to the foundation.

Yours very truly,
D. H. BURNHAM & CO.

Louisville Cement mortar made in the proportion of one cement to two sand, will develop a tensile strength of over 100 pounds per inch in seven days, and will withstand a crushing strength of over 1,000 pounds per inch in twenty-eight days.

Louisville Cement in bags of 4.77 cubic feet per barrel, costs less than 50 cents per barrel at the mills. At this price a simple calculation will show the economy of its use.

Write for Pamphlets and Test Sheets

Western Cement Company
251 West Main Street LOUISVILLE, KY.

THE CUMMER DRYERS
For Mechanically Drying Everything
The F. D. Cummer & Son Co., Cleveland, O.

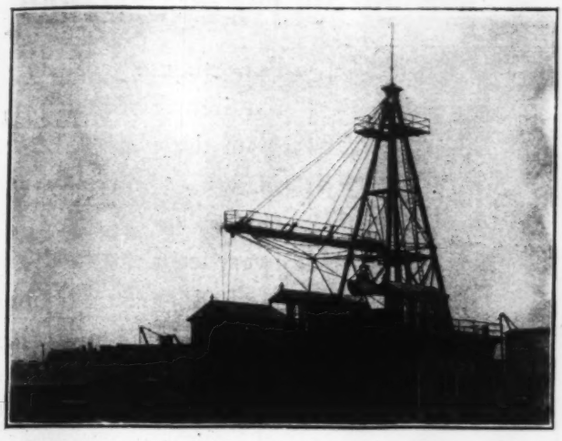
EMPIRE PORTLAND CEMENT
ECONOMY—STRENGTH—DURABILITY
Empire Portland Cement Company
WARNERS, N. Y.
JENKINS & MACY, Rochester, N.Y. ONONDAGA LITHOLITE CO., Syracuse, N.Y.
J. B. MOORHEAD, Agent, Franklin, Pa.

Kosmos Portland Cement
IS AN ESPECIALLY HIGH GRADE PORTLAND CEMENT
Only one brand is manufactured
Kosmos Portland Cement Co. (Inc.)
LOUISVILLE, KY.

ST. LOUIS PORTLAND CEMENT COMPANY
RED RING ST. LOUIS. BRAND
MANUFACTURERS ST. LOUIS

IMPROVED AUTOMATIC **DRIERS**
Presses, Digesters, Cookers For Mechanical Treatment of All Materials
AMERICAN PROCESS CO., 62-64 William St., N. Y.

Ruggles-Coles
DRYERS
NEW YORK Ruggles-Coles Engineering Co. CHICAGO



HOISTING and CONVEYING MACHINERY

At the 58th Street Power Station of the Interborough Rapid Transit Company, New York, we designed and built the Electric Hoisting Tower shown in the illustration—weighing and crushing machinery, the belt conveyors and scraper conveyors for handling coal, together with the ash handling system, consisting of electric storage battery locomotives, industrial cars and track, belt conveyors and storage bunkers.

Many similar installations are described in our Bulletin No. 12, sent on request.

ROBINS CONVEYING BELT CO.
18 PARK ROW, NEW YORK
Railway Exchange, Chicago, Ill. 53 State St., Boston, Mass.
Frick Building, Pittsburgh, Pa.

BOOKS ON ANY SUBJECT in which you are interested will be sent by us, charges prepaid, upon receipt of price. THE ENGINEERING NEWS PUBLISHING CO.

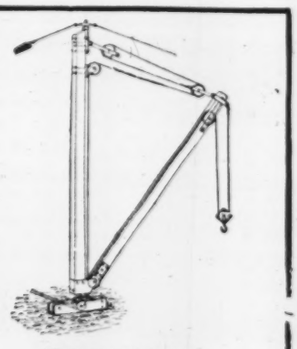
We Build and Install
Aerial Wire Rope Tramway Systems

Of Any Capacity
Of Any Length
For Any Material Anywhere
Level Country or Mountainous

AUTOMATIC
ECONOMICAL TO OPERATE
INEXPENSIVE TO MAINTAIN

A. LESCHEN & SONS ROPE CO.

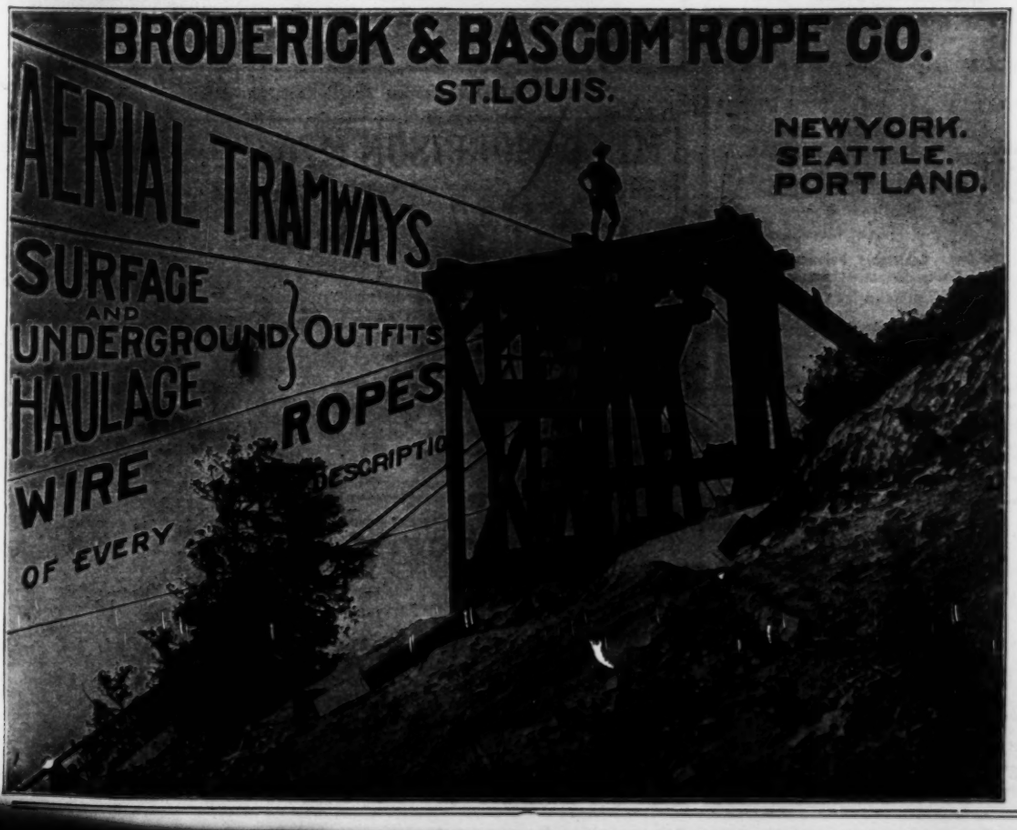
920-932 N. First St., St. Louis, Mo.
New York Chicago New Orleans Seattle Denver



DERRICKS
(PATENTED 1906)
HOISTING ENGINES
Send for our booklet
ALLEN & ROSS, 305 Penna. Bldg., PHILA., PA.

LEVIATHAN BELTING
has no mere "skin deep" potency, has no "moulting" season, when its coating peels off and for that reason it must be replaced with a new belt. There's a booklet in ambush awaiting your call.

MAIN BELTING COMPANY, Sole Manufacturers
New York Chicago PHILADELPHIA Boston Buffalo



INDUSTRIES ARE OFFERED LOCATIONS

WITH
Satisfactory Inducements,
Favorable Freight Rates,
Good Labor Conditions,
Healthful Communities,
ON THE LINES OF
THE ILLINOIS CENTRAL R. R.
AND THE
YAZOO & MISSISSIPPI VALLEY R. R.

For full information and descriptive pamphlet address,

J. C. CLAIR,
Industrial Commissioner.
205 1 Park Row, Chicago, Ill.

PLAIN LETTERING
BY PROF. HENRY S. JACOBY
Most comprehensive book on this subject. Contains standards of U. S. Engineer-Corps, U. S. Geological and Geodetic Surveys, and Mississippi River Commission.
Cloth, 10x7 inches; 82 pages, Price $3.00

THE WELLMAN-SEAVER-MORGAN CO.

WELLMAN-SEAVER-MORGAN ENGINEERING DIVISION — ENGINEERS AND MANUFACTURERS — WEBSTER, CAMP & LANE DIVISION

Hulett Excavating Bucket at Monte Rio Mining Co., California, digging stone from temporarily dry river bed. Also used in gold dredging work.

Hulett Patent Excavating Buckets

for handling ore, coal, crushed limestone, sand and other loose materials. Will fill themselves full of the largest lump coal. Especially suited for use in unloading material from limited areas, such as boats, cars, bins, etc. Extensively used on ore conveyors, stocking and rehandling bridges, locomotive cranes and revolving derricks, overhead traveling cranes, etc.; in fact can be adapted to almost any class of hoisting mechanism. Insure a great saving over hand shoveling. Built in a variety of sizes.

WRITE FOR DETAILS

Complete Iron and Steel Plants Designed and Equipped

GENERAL OFFICES: CLEVELAND, OHIO.

BRANCH OFFICES:

New York, 42 Broadway — San Francisco, Cal., Atlas Building
Chicago, 1328 First National Bank Bldg. — London, Eng., 47 Victoria St., S. W.
City of Mexico, Segunda de Dolores, 20

High-Speed Coal-Handling

Power-house coal-storage requirements often necessitate the utmost dispatch in the preliminary surveying. Water-front delivery calls for a distinct method—and our high-speed hoisting towers meet the condition.

Write for booklet and details.

The Dodge Coal Storage Company

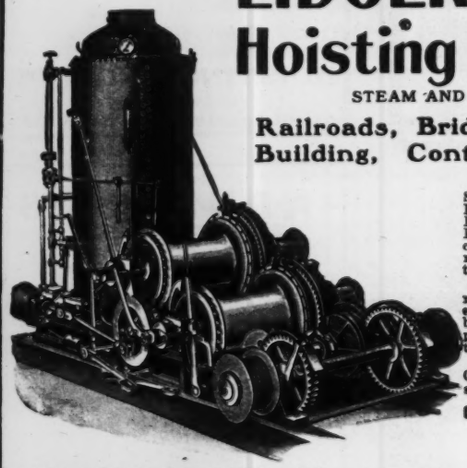
Philadelphia, Hunting Park Ave. and Reading Ry.
New York, 299 Broadway — Chicago, 39th St. and Stewart Ave.
Pittsburgh, 1501-02 Park Bldg. — Portland, Ore., 309 McKay Bldg.

OVER 27,000 IN USE

LIDGERWOOD Hoisting Engines

STEAM AND ELECTRIC

Railroads, Bridge and Dock Building, Contractors, etc.



The illustration shows a Standard Lidgerwood Double Friction Drum Engine, with Boiler, mounted with No. 4 Boom Swinging Gear. This combination makes one of the most useful engines for contractors' use.

The Boom Swinging Gear is mounted on an extension of the engine skids and is especially built for heavy duty. It is superior in every respect to anything heretofore produced.

Our latest Hoisting Engine Catalogue contains a full description of this swinging gear.

Cableways, Hoisting and Conveying Devices

Send for Catalogues

LIDGERWOOD MFG. CO., 96 Liberty St., New York

Pittsburg, Philadelphia — Seattle, New Orleans — Denver, Colo., St. Paul, Minn. — Atlanta, Boston — Cleveland, Chicago

LAMBERT Hoisting Engines

For Mining, Quarrying, Coal Handling, Pile Driving, Builders' Use, Logging and General Contracting

CABLEWAYS ELECTRIC HOISTS

Send for New Catalogue

LAMBERT HOISTING ENGINE CO.

Main Office and Works
115-121 Poinier Street, Newark, N. J.

New York City, 85 Liberty St.
Cambridgeport (Boston), Mass., 117 Main St.
Allegheny, Pa., Lacock and Sandusky Sts.
Philadelphia, Pa., 1710-1712 Market St.
St. Louis, Mo., 715 North Second St.
Baltimore, Md., 21 Builders' Exch.
Chicago, Ills., Old Colony Building
New Orleans, 722 Gravier St.

Please mention ENGINEERING NEWS.

MEAD-MORRISON MFG. CO.

Successors to
Rawson & Morrison Mfg. Co.

HOISTING ENGINES FOR ALL PURPOSES

Equipped with Latest Patent Improvements

Automatic Coal Handling Machinery

Clam Shell Shovels

Executive Offices and Works
Cambridgeport, Boston, Mass.

NEW YORK, 11 B'dway. CHICAGO, 48 Lake St.
PHILADELPHIA, 1406-22 Washington Ave.
BALTIMORE, 325 St. Paul St.
NEW ORLEANS, 200 South Peters St. SAN FRANCISCO, Rialto Bldg. BIRMINGHAM, Ala.

THE COST of a "WANT" Advertisement in ENGINEERING NEWS is 1½ cents a word, an insertion, for "Situations Wanted" 3 cts. a word for "Situations Open," and "Miscellaneous Wants."

FLORY HOISTING ENGINES

ARE UNEXCELLED

Adapted for Contractors, Mines, Quarries, etc.

CABLEWAYS and Dredging Machinery a Specialty

S. FLORY MFG. CO., Bangor, Pa.

THE CUT REPRESENTS OUR SPECIAL DERRICK ENGINE

MUNDY ENGINES FOR ALL PURPOSES

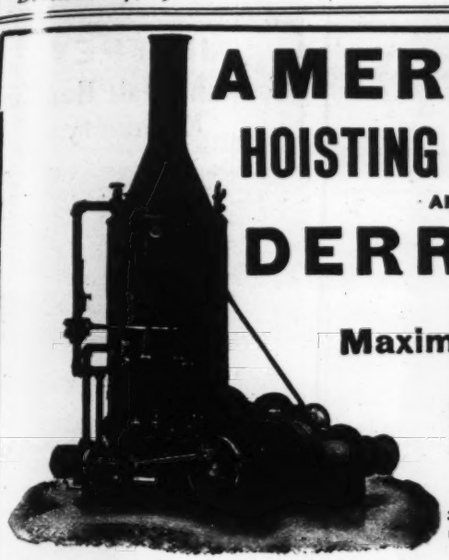
Mud Dredging — Coal Hoisting — Pile Driving — Quarrying
Dock Building — Bridge Erecting — Mining — *Send for Catalogue*

500 Different Styles

J. S. MUNDY, in successful operation **35** years

22 to 34 Prospect St., Newark, N. J. — 39 Cortlandt St., New York

1744 Market St., Philadelphia — 203 German Am. Bank, St. Paul
327 Water St., Pittsburg — 210 Washington St., St. Louis, Mo.
22 Light St., Baltimore — 34 Fremont St., San Francisco
224 Water St., Norfolk, Va. — 29 First St., Portland, Ore.
Market & Randolph Sts., Chicago — 110 Jackson St., Seattle, Wash.
140 Pearl St., Boston, Mass.



AMERICAN HOISTING ENGINES AND DERRICKS

GIVE

Maximum Results AT A Minimum of Cost and Effort

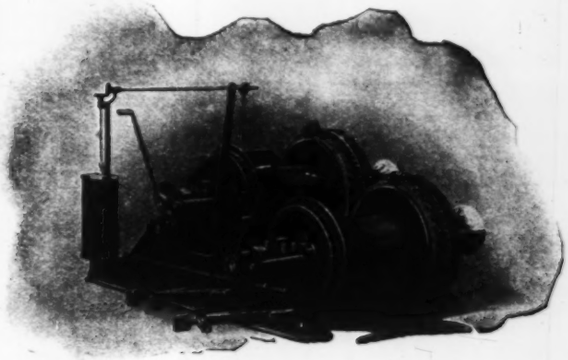
COMPLETE DESCRIPTIVE CATALOGUE YOURS FOR THE ASKING

American Hoist and Derrick Co., St. Paul, U. S. A.

CHICAGO NEW YORK BOSTON NEW ORLEANS SAN FRANCISCO

THE PITTSBURGH HOIST

The cut illustrates one of our Double-Drum Electric Hoists for operating all types of derricks and for general hoisting.



It is a well-known and accepted fact that, when it can be obtained, electric power is much cheaper than steam and, in addition to this, reduces the operating expense in not requiring a fireman.

The Electric Hoist has also the advantage of a greater variation in speed, and is capable of standing temporary overloads of 50 per cent., thus reducing the chances of breakage to a minimum.

Our Electric Hoists are built along the same lines as our Corliss type valve steam engines, being rigid in construction, with ample wearing surfaces, and fitted with our patented Splash-lubricating Device and Friction Pin Adjustment.

The motor is attached by means of machine-cut gearing, and electric brake furnished when so desired.

Our No. 75 Patented Tension Sheave Swinger can also be attached to these engines.

Built in all capacities, single, double or triple drum.

FOUNDRY MACHINE AND PLATE WORKS REYNOLDSVILLE

GENERAL OFFICES 1218-19-20 WESTINGHOUSE BUILDING PITTSBURGH PA.

PITTSBURGH INDUSTRIAL IRON WORKS

WE MANUFACTURE

PORTABLE HOISTING ENGINES

for all purposes, and sell them at the lowest possible price.

All Engines built on Steel Frame and with Steel Drum Barrels.

ALSO

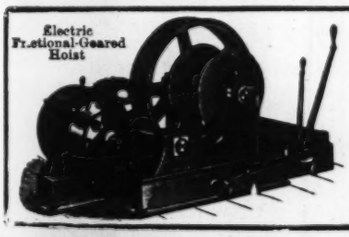
GEARED LOCOMOTIVES, DERRICK CARS DERRICK IRONS, HAND POWERS BLOCKS AND SHEAVES

We make a specialty of **DOUBLE PLATFORM ELEVATORS** for handling brick and mortar. These Elevators are adapted to any height building.

Write for Catalogue

The John F. Byers Machine Co.

RAVENNA, OHIO



Williamson Hoisting Engines

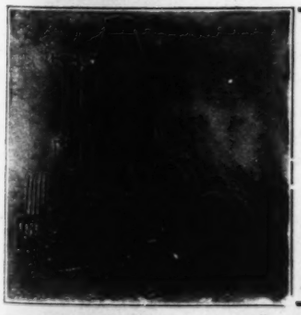
Are Standards of Reliability There are Reasons Why

Williamson Bros. Company

Engineers, Founders and Machinists

Aramingo Ave. and Cumberland St.

Catalogue sent on request. Philadelphia, Pa.



The Stroudsburg Engine Works

Builders of

High-Grade Hoisting Engines AND Electric Hoists

Improved Contractors' and Mine Hoisting Engines, Excavating, Dredging, Pile Driving and Logging Engines Quarry Hoisting Engines

STROUDSBURG, PA., U. S. A.

ONE OF THE GANG

Contractor's Hoist

Especially designed to fill a long-felt want by contractors and bridge builders for a light, portable hoist to operate derricks, elevators, conveyors and pile drivers. Engine can be instantly disconnected from hoist drum by simply throwing gears out of mesh. It is then ready to run other machines, such as:

Concrete Mixer	Air Compressor
Grind Stone	For Riveting
Pump	Chipping
Saw	Wood Framing or Boring

Send for Catalog 457-H

FAIRBANKS, MORSE & CO.

CHICAGO, ILLINOIS

Please mention ENGINEERING NEWS.

WE MANUFACTURE

SWINGING GEARS

DERRICK CRABS

PNEUMATIC HOISTS

CONTRACTORS' HOISTS

All of which can be used with either

Steam or Compressed Air

DAKE ENGINE CO.

Grand Haven, Mich.

SPRAGUE ELECTRIC

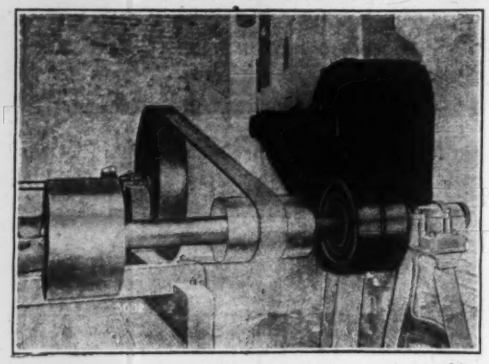
HOISTS AND CRANES

Write for copy of Pamphlet No. 22,543

SPRAGUE Electric Company

527 W. 34th St., New York City

WHEN looking for employees you may find Considerable Help by using the "Want" Pages of ENGINEERING NEWS.



Renold Silent Chain
SAVES POWER

Its weight *for strength* is below all other chain drives. *All* the power goes to the drive—it isn't absorbed by the weight of the chain. *Write for Booklet "D," and Special Bulletins 50, 52 and 58.*

LINK-BELT COMPANY

PHILADELPHIA CHICAGO INDIANAPOLIS

NEW YORK 299 Broadway | PITTSBURGH 1501 Park Bldg. | ST. LOUIS Missouri Trust Bldg. | BOSTON 164 Federal St

Webster V Bucket Conveyor for Handling Coal and Ashes

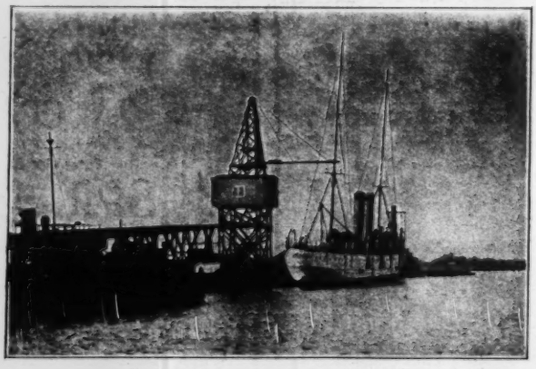
Elevating, Conveying and Power Transmitting Machinery
Designed and Installed for All Purposes

Eastern Branches
88-90 Reade Street, New York
Pennsylvania Building, Philadelphia
Empire Building, Pittsburg

WEBSTER M'F'G CO.
1075-1111 West 15th Street
Chicago

ADVANCE NEWS is always wanted for our CONSTRUCTION NEWS and our readers are often in a position to send us such items. We ask to be kept informed of new work.

Coal Handling and Conveying Machinery
CABLE RAILWAYS, INDUSTRIAL AND GRAVITY RAILWAYS, HOISTING ENGINES, "GRAB" BUCKETS, COAL CRUSHERS

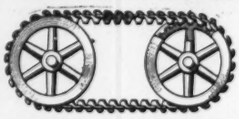


MONONGAHELA MFG. CO.
NEW YORK OFFICE, 120 LIBERTY ST. MONONGAHELA, PA.

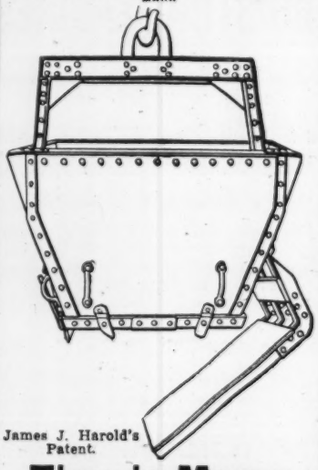
HIGH-SPEED CHAIN BELT
For Concrete Mixers, Coal, Coke, Cement, Ores, Sand, Wood Working Machinery, Tanneries, Cereals and Fertilizers.

This chain cannot ride the sprockets, though run at the high speed of 900 r. p. m. It is the only chain that can be run as a cross belt within 4-ft. centers and at a quarter turn within 18-ft. centers, besides as a direct drive on motors within 17-inch centers.

LINK CHAIN BELT COMPANY
Department L, 52 Dey Street, New York City
Executive Offices: 80 Wall Street, New York City
Branches: Chicago, Ill., Cleveland, O., Bridgeport, Ct.



TRADE
CYCLOPEAN
MARK



James J. Harold's Patent.

Time is Money
Cyclopean Buckets
Save Time—and Money—BECAUSE

1. You can lower the bucket to exactly the spot where you want the concrete and then deposit it in a mass.
2. They open easily and dump clean without hammering.
3. They close automatically when lowered on the loading platform.

You can handle more tons of concrete in a working day with a Cyclopean Bucket than with any other.

If your "time is money" it will pay you to investigate. Write for circulars.

THE CYCLOPEAN COMPANY
Successors to the Cyclopean Iron Works of N. Y.
30-34 Franklin St., Greenpoint, Brooklyn, N. Y.
Telephone, 59 Greenpoint

BROWNING
CLAM BUCKETS SHELL

HOISTING MACHINERY CO.
833 Park Row Bldg., New York

JEFFREY
Coal and Ash Handling Machinery

For Power House Equipment
Plans and estimates submitted free with catalogues on
Elevating, Conveying, Crushing, Screening, Power Transmitting
Ask for Chain Catalogue, No. 4

THE JEFFREY MFG. COMPANY
COLUMBUS, OHIO, U.S.A.
NEW YORK BOSTON ST. LOUIS
CHICAGO PITTSBURGH DENVER

ELECTRIC HOISTS
Sturdily built, self-contained and portable. Used wherever current is to be had. Lift readily at an angle. D. C. current—150 to 650 volts. Sizes 1 to 12 tons.
YALE & TOWNE, New York

Books on LETTERING
By C. W. REINHARDT. Price, $1.00
By Prof. H. S. JACOBY. Price, $3.00

NATIONAL HOISTING ENGINE CO.
STEAM AND ELECTRIC
Hoisting Engines
FOR ALL PURPOSES

Write for latest Catalog
Office and Works
Manor Ave. and Bergen St., Harrison, N. J.
305 Penn. Bldg. Philadelphia, Pa.
South Avenue Near Walker Street Allegheny, Pa.
202-208 S. Water St. Chicago
65 Dey St., New York

GANDY
PATENTED 1877

It's Tougher Than Leather or Rubber

and it's cheaper, too—a good deal cheaper. That's what makes it valuable as a carrier of sand, lime, cement, rock, clay or gravel.

Let us send you a catalog, "Experience with Gandy"; it's worth reading.

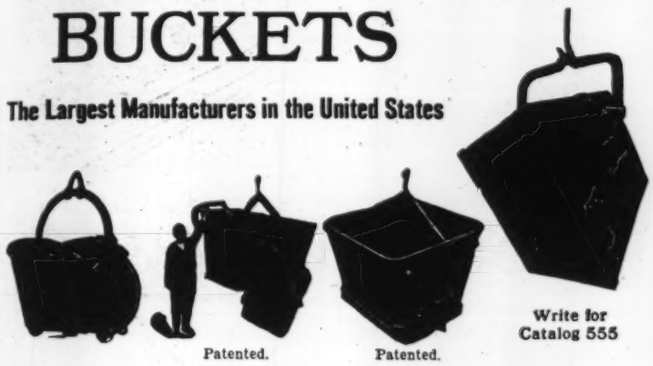
THE GANDY BELTING CO.
BALTIMORE, MD.

Headquarters for

"Excelsior" Bottom-Dumping and Contractors' Turnover

BUCKETS

The Largest Manufacturers in the United States



Patented. Patented.

Write for Catalog 555

G. L. STUEBNER IRON WORKS

FOOT OF 11th STREET, LONG ISLAND CITY, N. Y., N.Y., U. S. A.

THE UNION IRON WORKS

HOBOKEN, N. J.

Apparatus for Handling, Hoisting and Conveying Materials

OUR NEW TUBS FOR TRENCH WORK

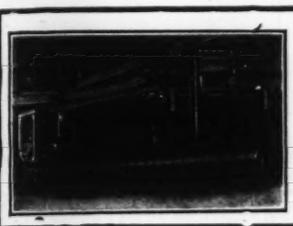
Have advantages that should interest every contractor

Tubs, Buckets, Dump Cars, Industrial Railways, Wheelbarrows, Sheaves, Tackle Blocks, Coal Chutes, Screens, Trucks, Asphalt Kettles and Furnaces

Lead Furnaces, Pipe Line Supplies

All kinds of Sheet Steel and Plate Work
Iron and Brass Castings, Forgings, etc.

OUR COMPLETE CATALOGUE may come in handy for Reference Purposes **Write for It**



SHEPARD

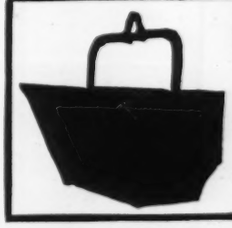
Travelling Electric Hoists

FOR SHOP AND INTERSHOP SERVICE

The General Pneumatic Tool Company

General Office and Works, Montour Falls, N. Y.

New York, Singer Bldg. Philadelphia, Stephen Girard Bldg



CONTRACTORS' BUCKETS

27 cubic feet capacity

IN STOCK for immediate shipment at attractive prices

WONHAM-MAGOR ENGINEERING WORKS

Department L

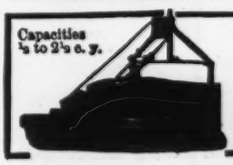
New York, 29 Broadway Boston, 141 Milk Street

Works, Passaic, N. J.

CRANES AND Traveling Electric HOISTS

Pawling & Harnischfeger

Milwaukee, Wis.



Capacities ½ to 2½ c. y.

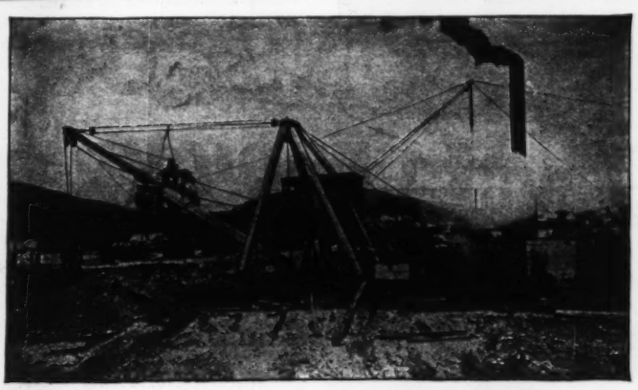
THE PAGE PATENTED BUCKET

THE LATEST SUCCESSFUL TWO-LINE

Self-Loading Automatic-Dumping Scraper Bucket

To be used with any type of derrick

PAGE & SCHNABLE, General Contractors, 1002 Security Bldg., CHICAGO, ILL.



Skid Excavator

BUCKETS

Orange Peel and Clam Shell Buckets are used for Dredging, Excavating and Coal Handling Purposes.

We build buckets and the machines that operate them.

Send for our catalogue, in which many different types are illustrated and described.

The Hayward Company

97-103 Cedar Street, New York, N. Y.

THE TRENTON IRON CO.

Trenton, N. J.

Wire Rope

Wire of All Kinds. Wire Rope Tramways, etc.

CYCLOPEAN

BOTTOM DUMPING

BUCKETS

(Jones' Patents)

For Handling Concrete

SHEET STEEL SCALE BOXES

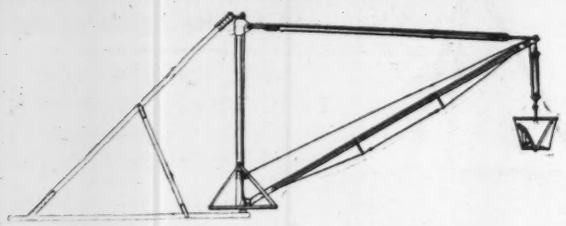
Contractors' Supplies

The Cyclopean Iron Works Co.

(Incorporated)

402 & 404 Claremont Ave., Jersey City, N. J.

DERRICKS



The above cut illustrates a standard type of Stiff Leg Derricks for heavy construction, or for operating clam-shell and orange-peel buckets. An outfit of this character we can make shipment within one week, with any length of boom up to 80 feet. Fittings are practically all of steel construction and of heavy design.

Stationary or portable. Arranged for clam-shell or regularly fitted for river, dock and general construction.

We install complete plants.

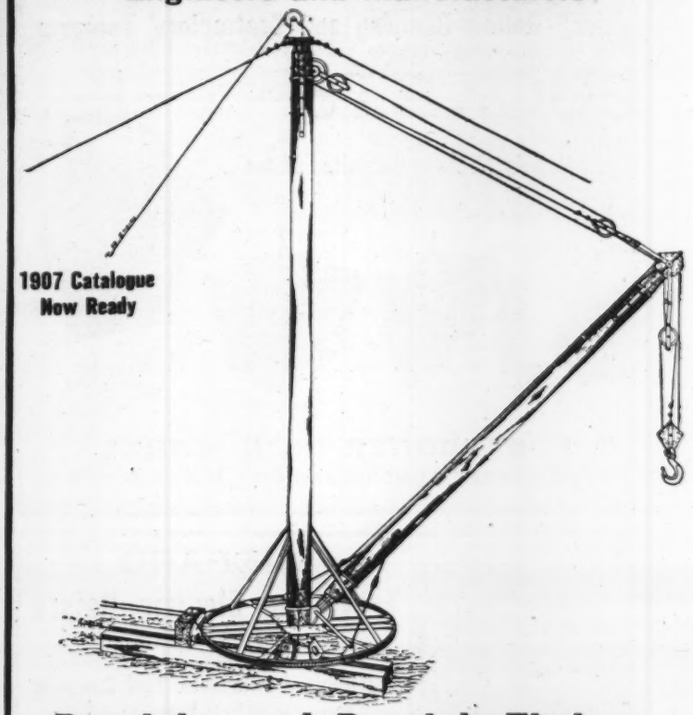
FOUNDRY MACHINE AND PLATE WORKS REYNOLDSVILLE

GENERAL OFFICES 1218-19-20 WESTINGHOUSE BUILDING PITTSBURGH PA

PITTSBURGH INDUSTRIAL IRON WORKS

DOBBIE FOUNDRY AND MACHINE CO.

Engineers and Manufacturers



1907 Catalogue Now Ready

Derricks and Derrick Fittings

Electric, Steam, Hand and Horse-Power Hoisting Machinery

Main Office and Works: Niagara Falls, N. Y.

Branch Store: 82 Warren Street, New York

THOS. CARLIN'S SONS CO.

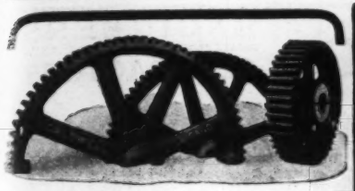
HOISTING ENGINES and DERRICKS

Large Stock of Oregon Fir Derrick Timbers in Long Lengths Continually on Hand in our Yards.

Steam Shovels, Locomotives and Contractors' Equipment and Supplies of Every Description.

Thos. Carlin's Sons Co.

Allegheny, Pa., U. S. A.



Good Gears

Hub, arms, rim and teeth symmetrical; rim true, teeth uniform in size and shape and accurately spaced. These are the qualities that give Caldwell gears great durability and high efficiency. Caldwell gears work smoothly and wear long.

H. W. Caldwell & Son Co.

Chicago, 17th St. and Western Ave.

New York, 95 Liberty Street
Woodward, Wight & Co., Ltd., New Orleans

INTERNATIONAL CREOSOTING & CONSTRUCTION CO.

WORKS-BEAUMONT, TEX. TEXARKANA, TEX.

Capacity 75,000,000 FEET B.M. Per Annum

ADDRESS ALL COMMUNICATIONS TO OFFICE GALVESTON, TEXAS

SEND FOR PAMPHLET

WOOD PRESERVING

"Industrial Railways"

(HUNT PATENT)

Every corner in a factory or works is rendered accessible by this system. Two styles of track, rolled steel and cast plate, are kept in stock for immediate shipment.

Cars to suit every variety of service. Our new catalogue, "Industrial Railways," will be sent on request.

C. W. HUNT COMPANY

Taylor Street West Brighton, N. Y.

New York Office, 45 Broadway

Carbolineum Wood-Preserving Co.

C. S. McKINNEY, Manager

60 Wall Street New York, N. Y.

This Company originated in Nashville, Tennessee, and has been in New York City since 1894. Not in any way connected with other Carbolineum Wood-Preserving Companies, which sell proprietary brands. All patents on manufacturing Carbolineum having expired, there is no further need to pay royalties. We furnish all obtainable grades at lowest prices, and do not have to recommend one manufacturer's single brand for all purposes. Send statement of your requirements to our sole selling agents.

C. S. McKINNEY CO., 60 Wall St., New York

Carbolineum Wood-Preserving Co.

INCORPORATED

349 West Broadway, New York, N. Y.
128 Reed Street, Milwaukee, Wis.
160 Front Street, Portland, Ore.

Avenarius CARBOLINEUM

On the Market Since 1875

U. S. Patent Office No. 14048 and 16788

Also protected by patents in England and Germany

Preserves Wood Against Rot and Decay

GULFPORT CREOSOTING COMPANY

GULFPORT, MISS.

All Kinds of Railroad Material, Piling, Telegraph and Telephone Poles and Cross Arms, treated by either the

FULL CELL OR RUEPING PROCESS

A NEW AND MODERN PLANT

Office: Stamford, Conn. Works: Portsmouth, Va.

THE WYCKOFF PIPE & CREOSOTING COMPANY

ESTABLISHED 1881

CREOSOTED Railroad Ties, Bridge Timbers, Piles, Poles, Paving Blocks and Lumber

Manufacturers of CROSS ARMS and WYCKOFF CONDUIT for UNDERGROUND WIRES

WOOD PRESERVING

DEAD OIL OF COAL TAR PROCESS

Lumber, Paving Blocks, Ties, Cross Arms, Poles, Piling, Treated According to Specifications

Capacity 1,800,000 Feet Per Month

THE BARBER ASPHALT PAVING COMPANY

Dept. N, MAURER, N. J. Rail or Water Delivery

Southern Creosoting Company, Ltd., SLIDELL, LOUISIANA U. S. A.

Twenty-eight miles from New Orleans, La., surrounded by the finest timber lands in the South. Facilities for shipping by water and rail.

CREOSOTED TIES, TELEGRAPH POLES, CROSS ARMS, TIMBER, PILES AND PAVING BLOCKS

Capacity, 2,000,000 feet per annum.

A. B. C. Code used. Cable Address, Creosote, Slidell, La. Send for Catalogue.

Atlantic Creosoting & Wood Preserving Works, Norfolk, Va.

This thoroughly modern plant, equipped with three cylinders and latest appliances for the treatment of piles and timber with Creosote Oil or other preservatives, is situated immediately on Norfolk harbor, with unequaled facilities for shipping via rail or water. We solicit your inquiries, assuring our customers lowest possible prices consistent with specifications and prompt delivery of orders.

W. H. WALES, Jr., General Manager, NORFOLK, VA.

AMERICAN CREOSOTE WORKS Limited NEW ORLEANS LA.

PILING, TIES, TIMBER

Capacity, 50,000,000 Feet B. M. per Annum

EPPINGER & RUSSELL CO.

Office, 66 Broad St., New York
Works, Long Island City

Send for Circular

Dead Oil of Coal Tar Process

CREOSOTING WORKS

Creosoted Piles and Timber furnished

Mfrs. of the VALENTINE SUBWAY ELECTRIC CONDUIT

Capacity, 1,500,000 feet per month Four Cylinders 100 feet long

E. A. BUEHL, President EDM. CHRISTIAN, Eng. and Gen. Mgr. PERCY A. SMITH, Asst. Mgr.

Norfolk Creosoting Co.

A Modern Plant Adapted to Filling the Most Rigid Specifications

Citizen's Bank Building
Norfolk, Va., U. S. A.

SEND FOR DESCRIPTIVE BOOK
Spanish or English

Puget Sound Timber Preserving Co.

Works at Everett, Wash.

San Francisco Timber Preserving Co.

Works at San Francisco, Cal.

Creosoting of Lumber and Piles and Telegraph Pole Butts by our Special Improved Process

Offices { 225 Folsom St., San Francisco
Globe Block, Seattle, Wash.

CREOSOTING

Docks, Railroads, Telegraph and Telephone Work, Wood Block Paving

On account of water and railroad facilities on Passaic River and C. R. R. of N. J., we can make immediate shipments to all points

AMERICAN CREOSOTING CO., 29 Broadway, New York

Works, Newark, N. J.

WEST PASCAGOULA CREOSOTING WORKS

West Pascagoula, Miss., U. S. A.

Situated on Pascagoula Bay, and on the line of the Louisville & Nashville Ry. Est. 1875. Orders for creosoted piles, telegraph poles, cross-arms, electric conduits, paving blocks, sawed ties and timber promptly executed. Cylinders 120 feet long. Capacity one million feet per month. A. B. C. code used. Cable address, Pierre, West Pascagoula, Miss. Address, JNO. B. LINDSEY, Supt.

New Orleans Wood Preserving Works

Docks and Works, New Orleans, La.

The latest designed plant for the manufacture, and treatment of wood with Creosote. Under one personal engineering management during twenty years. Is specially constructed for the perfect treatment of wood to prevent decay. Through our patents furnishing work of greater efficiency than can be obtained from other plants through the old processes. Cable address, W. U. Code—Norwood, New Orleans, La.

The Contractors' Plant Manufacturing Co.

131 ERIE ST., BUFFALO, N. Y.

Derricks, Steel, Wood or Pipe. Jib Cranes, Derrick Irons, and Contractors' Supplies.

Electric, Steam, Horse and Hand Power

HOISTING MACHINERY

Double Drum Hand Power

Have Large Stock on Hand

THE BROWNING ENGINEERING CO., CLEVELAND, O. DEPT 8

Locomotive Cranes and AUTOMATIC GRAB BUCKETS OUR SPECIALTIES

Atlantic, Gulf & Pacific Co., ENGINEERS AND CONTRACTORS

Dredging plant controlled by us has a capacity under favorable conditions of 3,000,000 cubic yards per month

Hydraulic Dredge discharging through 7,170 feet of pipe

CORRESPONDENCE SOLICITED

MAIN OFFICE
Park Row Building
NEW YORK

Specialties { Dredging, Dredging Machines
Land Reclamation, Docks
Piers, Foundations, Bridges

BRANCH OFFICES
220 Market St., San Francisco
95 Yesler Way, Seattle, Wash.
Manila, Philippine Islands
433 Granville St., Vancouver, B. C.

ATLANTIC STEAM SHOVEL

Commends itself to users for its
Simplicity of design; large and efficient boiler
Free steaming and low fuel consumption
Minimum breakdowns and repair costs

ATLANTIC EQUIPMENT COMPANY

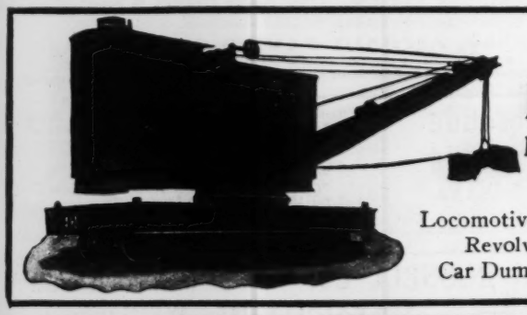
RAILWAY EXCHANGE, CHICAGO — 111 BROADWAY, NEW YORK

PUGET SOUND BRIDGE & DREDGING CO., Inc.

ENGINEERS
CONTRACTORS

95 YESLER WAY, SEATTLE, WASHINGTON
Bridges, Structural Work, Piers and Foundations, Harbor Improvements, Dredging and Land Reclamation

New York Offices:
ROOM 2407
PARK ROW BUILDING



THE McMYLER Manufacturing Co.

CLEVELAND, O.

Locomotive Fueling Plants
Revolving Cranes
Car Dumpers, Buckets

A Berquist Suspension Bunker

IS LIKE A GOLD DOLLAR
ONE HUNDRED CENTS EVERY TIME

The English Government has just bought a 10,000-ton bunker for a Navy Coaling Station

For Storing Coal, Ore, etc., write me for a suggestion and an estimate

A. SAM'L BERQUIST

1571 47th Street — Brooklyn, N. Y.

BOOKS ON ANY SUBJECT in which you are interested will be sent by us, charges prepaid, upon receipt of price. THE ENGINEERING NEWS PUBLISHING CO.

Our Works were uninjured and are in full operation

EL DORADO DREDGE

GOLD DREDGES

We are the largest and most successful builders of gold dredging machinery in the world. Send us detailed description of requirements. Estimates will then be forwarded immediately. Send for Gold Dredging Machinery Catalog, No. 17.

RISDON IRON WORKS
311 Steuart Street
San Francisco Cal., U. S. A.

M. BEATTY & SONS, Limited

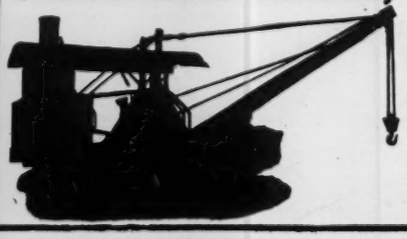
WELLAND, ONTARIO, CANADA.

DREDGES, DITCHERS, DERRICKS, STEAM SHOVELS,

Submarine Rock Drilling Machinery,
Mine Hoists, Hoisting Engines,
Centrifugal Pumps for Water and Sand,
Stone Derricks, Clam Shell Buckets,
Steel Skips, Coal and Concrete Tubs
and other Contractors' Machinery.

INDUSTRIAL WORKS, BAY CITY, MICH.

MANUFACTURERS



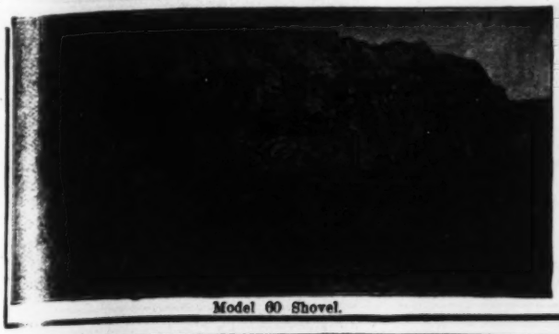
Locomotive Cranes
Capacities 3 to 30 tons

WITH OR WITHOUT CLAM SHELL OR ORANGE PEEL BUCKETS

Are You in the Market? If so let ENGINEERING NEWS help you. We can help you very materially with *no expense to either buyer or seller.* Notice of your wants will be sent our advertisers.

This letter shows how buyers appreciate the service:

ENGINEERING NEWS PUBLISHING CO.
Gentlemen:
We are getting everything in the line of catalogs and general information from the several firms you mention, and certainly do not need more, for these seem to more than cover the whole ground in every line. Many thanks to you in the matter.
Yours most truly, F. A. S——, Deadwood, S. D.



Model 60 Shovel.

TRACTION *and* STEAM **SHOVELS** ALL SIZES

DREDGES
DITCHING MACHINERY
BALLAST UNLOADERS

We Manufacture Our Own
Boilers, Chains
Also
Steel and Gray Iron Castings
Write us Your Wants

THE MARION STEAM SHOVEL CO., 620 W. Center St., Marion, O.

G. W. BARNHART, Western Manager
No. 4 Monadnock Bldg., San Francisco

F. H. HOPKINS & CO.
Montreal, P. Q.

THE THEW AUTOMATIC SHOVEL COMPANY
LORAIN, OHIO

EXCAVATORS FOR RAILROADS, CONTRACTORS and MINES

SINGLE TRUCK SHOVELS
For Ore Docks and Mines, Brickyards, Blast Furnaces, Smelters, Cement Works

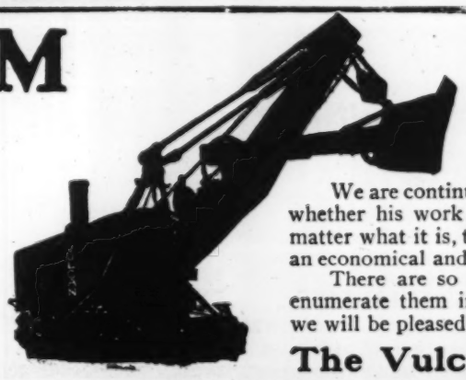
CONVENIENT and ECONOMICAL in OPERATION

Write for Catalogue

STEAM SHOVELS

Built in the following sizes

110-ton	5 Cubic Yard Dipper
95-ton	3 Cubic Yard Dipper
75-ton	2½ Cubic Yard Dipper
60-ton	2 Cubic Yard Dipper
40-ton	1¼ Cubic Yard Dipper
30-ton	1¼ Cubic Yard Dipper
32-ton	1¼ Cubic Yard Dipper
20-ton	⅝ Cubic Yard Dipper
22-ton	⅝ Cubic Yard Dipper

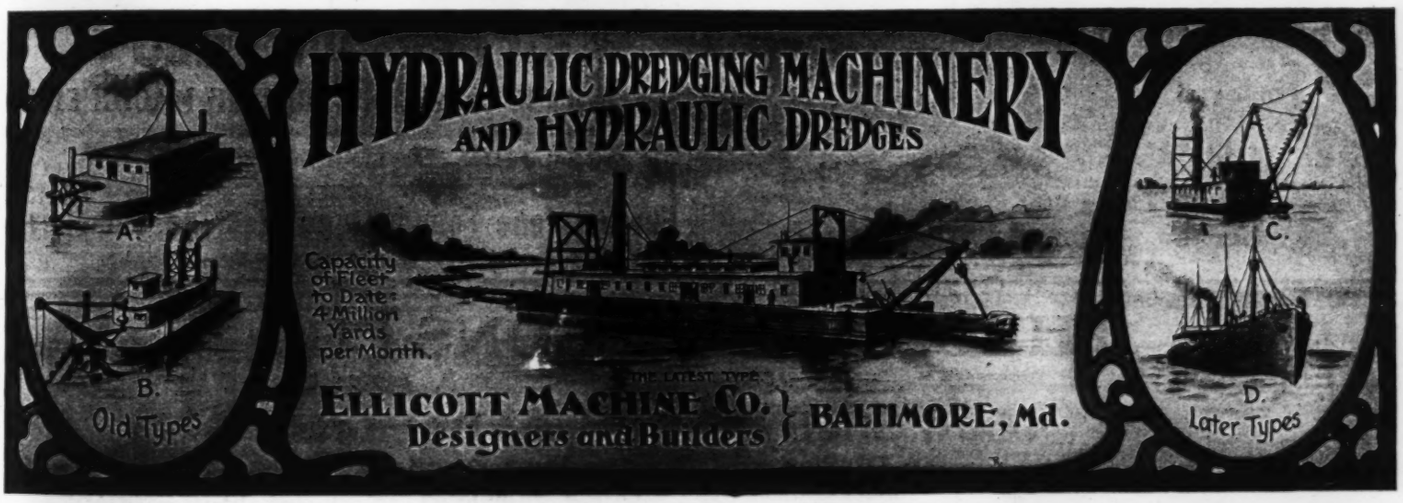


The service required of a steam shovel is so strenuous that it requires a variety of design and capacity to meet this demand made on them.

We are continually on the alert to fill the requirements of every contractor; whether his work is sewer or trench work, mining, stripping, tunneling, no matter what it is, the Vulcan "Heavy Duty" Steam Shovel does it for him in an economical and satisfactory manner.

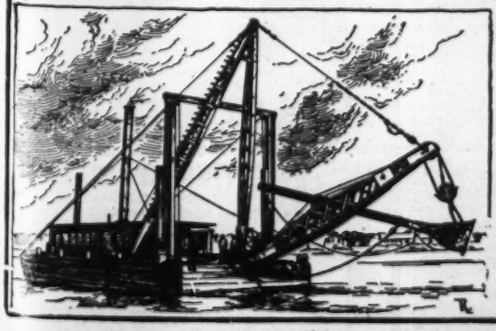
There are so many improvements in our new models that we cannot enumerate them in this small space, but just write us about your work and we will be pleased to give you complete information regarding our shovels.

The Vulcan Iron Works Co., 112 Vulcan Place Toledo, Ohio, U. S. A.



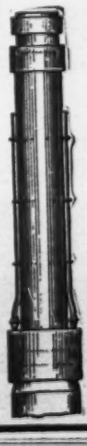
In Writing to Advertisers Please Mention ENGINEERING NEWS.

OSGOOD DREDGE COMPANY



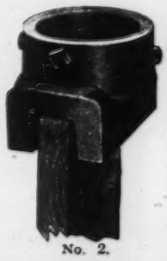
Dredges
Ditching Machines
Derrick Cars
Excavators

37 STATE STREET
Albany, N. Y.



No. 1.

No. 3.



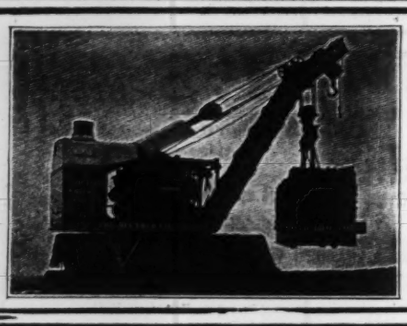
No. 2.

Followers, Pile Caps
Follower Bands

VULCAN IRON WORKS
Station U, Chicago, Ill.

PILE DRIVERS

THE COST OF A "WANT" ADVERTISEMENT in ENGINEERING NEWS is 1½ cents a word, an insertion, for "Situations Wanted" and "Situations Open," and 2 cents a word for "Miscellaneous Wants"

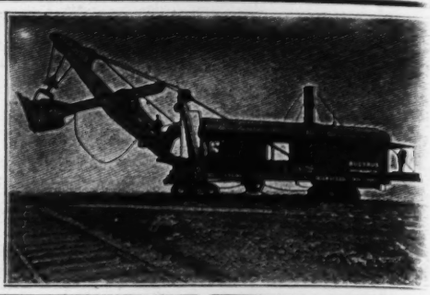


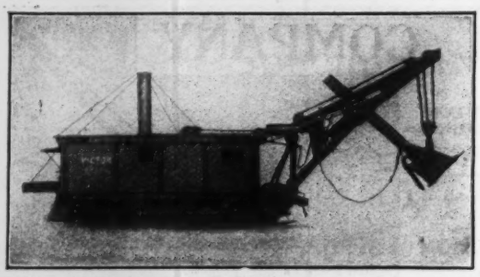
THE BUCYRUS CO.

SOUTH MILWAUKEE, WIS.

Placer Dredging Machinery of the Elevator Bucket Type
Dipper Dredges
Railroad Pile Drivers, Centrifugal Dredging Pumps

WRECKING CRANES
STEAM SHOVELS AND DREDGES





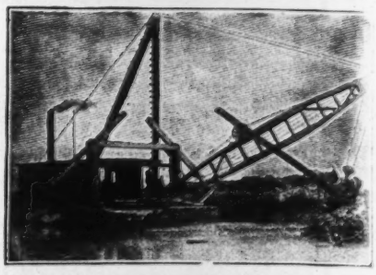
"VICTOR" STEAM SHOVELS ALL SIZES

ALSO:

Traction Shovels, Dredges
Centrifugal Sand Pumps, etc.

For full information address

The Toledo Foundry and Machine Co.
TOLEDO, OHIO.



— PATENT. —
HYDRAULIC SEA-GOING SELF-PROPELLING DREDGE.
DISCHARGING THROUGH 6000 FT. OF PIPE.

CABLE ADDRESS:
"NORTH" S.F.
Western Union Code.

NORTH AMERICAN DREDGING COMPANY

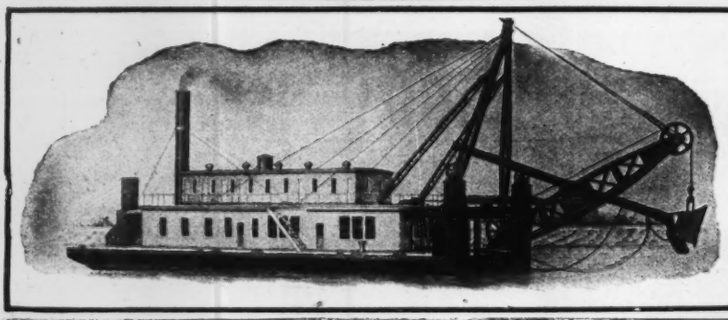
ADDRESS ALL COMMUNICATIONS TO THE COMPANY.

INCORPORATED

SPECIALTIES
Dredging, Land Reclamation
Dredging Machines

MAIN OFFICE
San Francisco, Cal.

BRANCH OFFICES
Honolulu, T. H.
Los Angeles, Cal.
Seattle, Wash.
Jacksonville, Fla.
New York



DIPPER DREDGES

ICE MAKING and REFRIGERATING MACHINERY

GREY IRON CASTINGS OF ALL KINDS

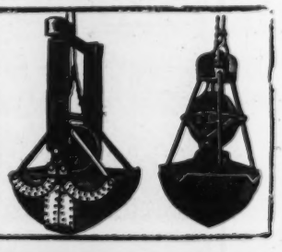
Featherstone Foundry and Machine Company
348 NORTH HALSTED STREET, CHICAGO, ILLS.

THEO. SMITH & SONS CO.

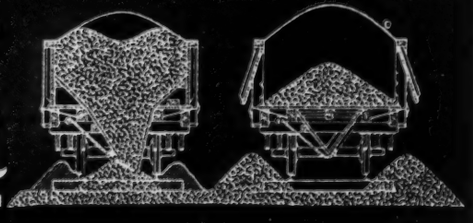
Telephone Call, 44 JERSEY CITY, N. J. Established 1865 Incorporated 1899

Manufacturers of

Clam Shell Dredges and Buckets
Also Dipper and Orange Peel Buckets
Blacksmiths, Machinists and Boilermakers



Hart Convertible CONSTRUCTION BALLAST and GONDOLA CAR



A Center-Dump, Side-Dump and Flat-Bottom Gondola-All in One

Diagonal shading shows position of ballast after being spread by the Rodger Distributing Car which follows the hopper cars.

Rodger Ballast Car Co. Railway Exchange, CHICAGO.

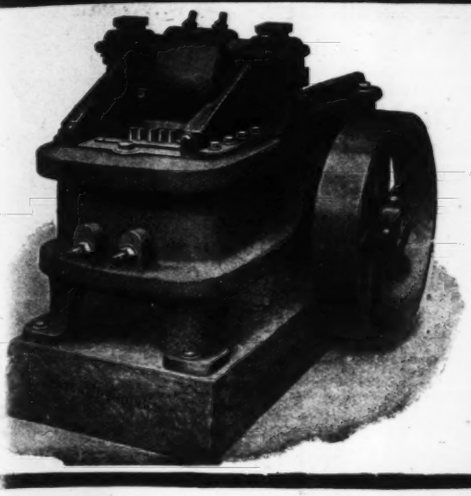
A. Schrader's Son, Inc.
32 Rose St., New York
Manufacturers of Est. 1844
DIVING APPARATUS
Complete Stock of Dresses, Hose and Repair Sundries.
Improved Bolt Helmet.
All orders filled day received.
Write for Our Prices.

A. J. MORSE & SON, Inc.
221 High St., Boston, Mass.
Established 1837
DIVING APPARATUS
LATEST DESIGNS.
Orders filled day received.
Special apparatus built to order.

NO EXTRA CHARGE

CLASSIFIED ADVERTISEMENTS for Engineering News may be left at an American District Messenger Office in New York city until 9 p.m. every day.

Classified Advertisements in Engineering News bring results.



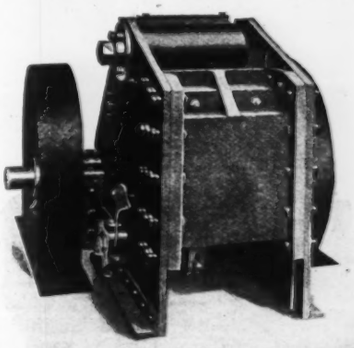
Rock and Ore Reduction Machinery

THE LARGEST LINE BUILT

10 Kinds of Crushers
for All Kinds of Work

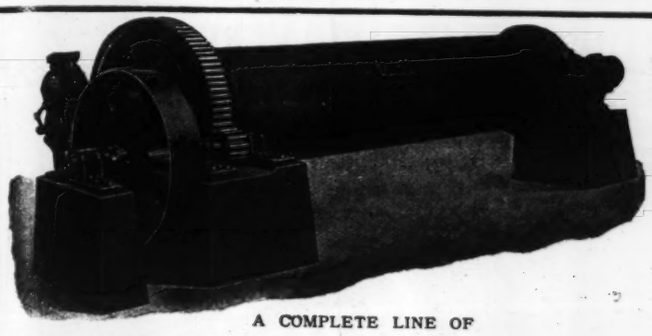
Crushing Rolls
Grinding Mills Screens, etc.

SEND FOR CATALOGUE



STURTEVANT MILL CO.,
115 Clayton St., BOSTON, Mass.

In Writing to Advertisers Please Mention ENGINEERING NEWS.

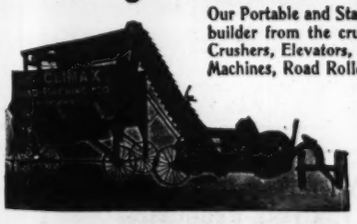


A COMPLETE LINE OF
CEMENT MACHINERY FOR WET OR DRY PROCESS
ROTARY KILNS, BALL MILLS AND TUBE MILLS
THE BONNOT COMPANY, Canton, Ohio

PULVERIZERS For Grinding HARD Materials
CEMENT, ORES, LIMESTONE, TRAP ROCK, COAL, ETC.
MINING AND CEMENT MACHINERY
KENT MILL CO. 170 Broadway, New York

MODERN ECONOMICAL EFFICIENT
CEMENT MAKING MACHINERY
of the most improved style for either wet or dry process. Alsing Tube Mill guaranteed to consume 30% less horse-power than any other. Particulars sent on application.
J. R. ALSING CO., Engineers and Builders, 136 Liberty St., New York

Crushing the Stone to the Finished Road



Our Portable and Stationary Plants fill every need of the road builder from the crushing process up to the finished road. Crushers, Elevators, Screens, Bins, Distributing Wagons, Road Machines, Road Rollers, Drags, Scrapers, Sprinklers.
GET A CATALOG.
Climax Road Machine Co.
MARATHON, N. Y.
BRANCHES: Harrisburg, Pa.; Pittsburg, Pa.; Boston, Mass.; Nashville, Tenn., Albany, N. Y.

What Makes a Wheelbarrow?

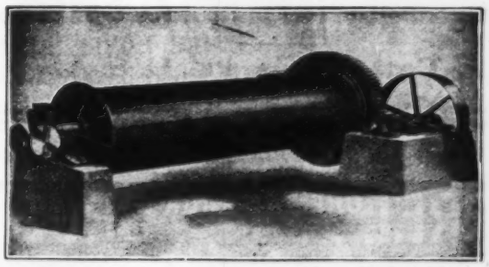
Some Dealers think a hoop, some spokes, a tray and two handles. They do, but not the "Sterling."
The "Sterling" is made on Scientific Principles, braced and bolted to carry a load 50 per cent. greater than others, and does it. The "does" is the Contractors' reason for buying it. Our specialty is wheelbarrows. Send for folder which shows all kinds of "Sterling" Wheelbarrows. Get Prices.

Sterling Wheelbarrow Co., 238 Oregon St. MILWAUKEE, WIS.

BOOKS ON ANY SUBJECT in which you are interested will be sent by us, charges prepaid, upon receipt of price. THE ENGINEERING NEWS PUBLISHING CO.

POWER AND MINING MACHINERY COMPANY

Designers and Builders of
Cement-Making Machinery
of all kinds, for either the wet or dry process



Many of the most eminently successful plants in operation to-day were designed by our engineers

Rock Breakers, Crushers, Dryers, Kilns, Ball Mills, Ball-Tube Mills, etc.

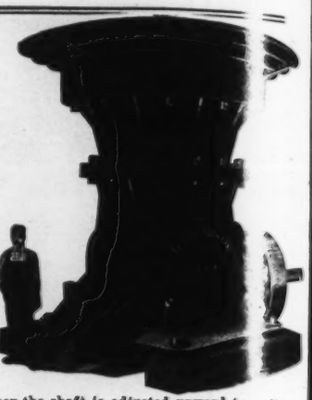
Write for Specifications and prices

Sales Offices: Atlanta, Boston, Chicago, Columbus
Works and General Offices: Cudahy, Wis.
Sales Offices: Denver, El Paso, New York City, Salt Lake City

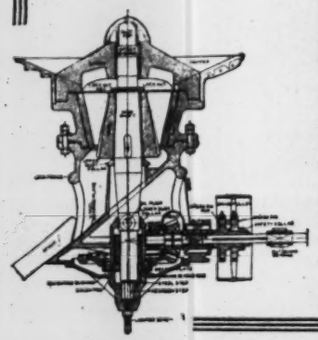
As a Money Maker
The CHAMPION STEEL ROCK CRUSHER STANDS AT THE HEAD.

BUILT IN SEVERAL SIZES.
ELEVATING, CONVEYING & SCREENING MACHINERY.
Address:
GOOD ROADS MACHINERY CO.
KENNETT SQUARE, PA.

THE FEATURES OF SUPERIORITY
WHICH ESTABLISH THE SUPREMACY OF THE
AUSTIN GYRATORY CRUSHER



Every **good feature** of every other gyratory crusher is embodied in the "Austin," but its superiority lies in **improvements** contained in no other crusher.



It has long double bearings supporting the counter-shaft on **both sides** of the pinion, insuring **permanent** alignment of the counter-shaft and **perfect** mesh of gear. All other crushers have a **single** bearing only and lose their alignment rapidly, resulting in the **breaking** of **teeth** or **gears** on pinion and drive gear.

The enormous load, which in other crushers is sustained on the **bottom plate,** is in the "Austin" placed directly on the **main frame,** the largest, heaviest, strongest and most rigid part of the entire machine, exactly where it rightfully belongs. In all other crushers the eccentric bearing which carries the crushing strain and which imparts the motion to the machine is supported by the **bottom plate,** which is simply attached to the main frame by **bolts.**

The "Austin" Crusher is equipped with an **automatic** oiling system operated by the gyratory motion of the **main shaft,** pumping a **constant** supply of live oil from an oil cellar through the **eccentric** and on all the bearings at the bottom of the crusher, insuring more **perfect** lubrication and, consequently, longer wear of bearings than any other crusher.

The gears are perfectly protected from dust by **two partitions** or **diaphragms** cast integral with the main frame, greatly adding to the strength of the crusher, and protected from wear by removable steel bushings.

The lower diaphragm encloses **all** the working parts in the lower part of the crusher in an **absolutely dust-proof** chamber and reduces lost motion to the minimum.

The sides of the upper part of the crushing head are **vertical** to the extent of its upward adjustment, maintaining the **maximum** receiving opening when adjusted to any position. All other crushers have **conical** or wedge-shaped heads, **reducing** the size of the receiving opening when the head is adjusted upward.

In normal position the shaft projects below the eccentric, affording a **full-bearing** surface when the shaft is adjusted upward to provide for wear on the head.

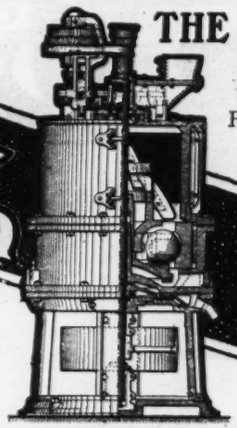
It has the **greatest capacity** per horse-power, **easiest adjustments,** and is the **only automatically-lubricated** crusher made. Built in **eight sizes,** capacities from **40** to **2,000** tons per day.

We are the world's largest builders of rock and earth-handling machinery. Catalogues of all machines on request.

Austin Manufacturing Co., Chicago, U. S. A. NEW YORK OFFICE, PARK ROW BLDG.

Better Fineness
Dustless
Grinding

Fuller-Lehigh Pulverizer Mill



THE BEST PULVERIZING MILL MANUFACTURED

Four unattached balls do the pulverizing. They are readily replaced and do not wear rapidly. Entire mill can be dismantled and reassembled in a very short time.

Greatest Output

"I think you have an **Ideal Mill,** *and one which I believe will be recognized as the most economical and satisfactory machine on the market."*

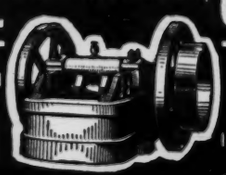
Lehigh Car, Wheel and Axle Works

Catasauqua, Pa., U. S. A.

Eng. News.

In Writing to Advertisers Please Mention ENGINEERING NEWS.

FARREL ORE AND ROCK CRUSHER



Specially Designed and Constructed for Hardest Kind of Work

Large Receiving Capacity

In Use by Largest Mining Companies

EARLE C. BACON, ENGINEER
FARREL FOUNDRY & MACHINE CO.
HAVEMEYER BUILDING NEW YORK

THE BRENNAN ROCK AND ORE CRUSHER

"IT MAKES THE BEST MACADAM"
LET US SEND YOU OUR NEW CIRCULAR?
COLDWELL-WILCOX CO., Newburgh, N. Y.

Are Your Kilns Long Enough?

Why not increase your present capacity by lengthening your old ones? Possibly we can save you money; at any rate, asking us questions will cost you nothing.

VULCAN IRON WORKS, Wilkes-Barre, Penna., U. S. A.

BUCHANAN ROCK CRUSHERS

All Tensile Strains on Steel
Strongest Crusher Made
Wide Range of adjustment
All Wearing Parts Invertable
Built in Eight Sizes from 7" x 10" to 24" x 38"
Daily Capacities from 50 to 1000 Tons
CRUSHING ROLLS
MAGNETIC SEPARATORS

C. G. BUCHANAN, CONSULTING ENGINEER, 141 LIBERTY ST., NEW YORK.

GEO. V. CRESSON CO.
POWER TRANSMITTING MACHINERY
PHILADELPHIA AND NEW YORK

RAYMOND MILLS AND PULVERIZERS

ARE THE BEST FOR FINE REDUCTION
SEE OUR AD. IN ISSUE OF DEC. 20
RAYMOND BROS. IMPACT PULVERIZER CO., 146 Laflin Street Chicago, Ill.

ROAD BUILDING MACHINERY

and supplies of every description
ACME ROAD MACH'Y CO., FRANKFORT, N. Y., U. S. A.

PORTLAND CEMENTS

The Standard American Brands

For Sidewalks and all other work requiring the Highest Quality Portland Cements.

Used by the U. S. Government and the Largest Contractors and Users of Portland Cements in the United States

THORN CEMENT CO., 23 West Swan St., Buffalo, N. Y. Long Distance 'Phone

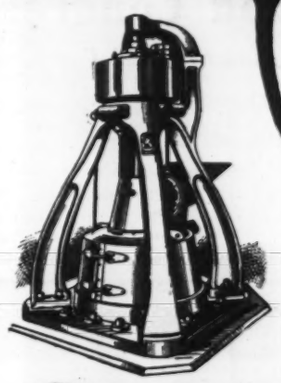
Cement particles coarser than 200 mesh are practically inert. On account of finer grinding, 'EDISON' Portland Cement contains about 10 per cent. more active cement than other standard brands

Edison Portland Cement Co.

Real Estate Trust Building, Philadelphia
St. James Building, New York
Machesney Building, Pittsburg
Union Bldg., Newark, N. J.

TRADE Thomas A Edison MARK

The GRIFFIN Mill



The Greatest Pulverizing Machine in the World

Used Wherever Portland Cement is Made

OVER 50 PER CENT. OF THE PORTLAND CEMENT MANUFACTURED IN THE UNITED STATES TO-DAY IS GROUND IN THE GRIFFIN MILL.

The Griffin Mill pulverizes more cement than the combined output of all other machines used for this purpose.

Thoroughly tested by continually successful and constantly increasing use during the past sixteen years.

Portland Cement Clinker reduced from ½ inch to required fineness in one operation, with no auxiliary apparatus. No other machine made will do this.

Buy the GRIFFIN MILL and get the BEST. It holds the world record from every standpoint.

Send for Catalogue and full information.

Bradley Pulverizer Company, 92 State St., Boston

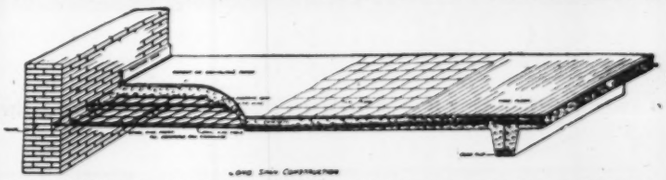
HELDERBERG PORTLAND CEMENT

High Tensile Strength
Uniform in Quality and Color

The Helderberg Cement Co.
Albany, N. Y.

Books on LETTERING
By C. W. REINHARDT. Price, $1.00
By Prof. H. B. JACOBY. Price, $3.00

THE INTERNATIONAL SYSTEM OF FIREPROOFING



CONTINUOUS STEEL WIRE FABRIC AND STEEL CABLES ARE MOST ECONOMICAL, SCIENTIFIC AND PRACTICAL FOR LONG OR SHORT SPANS. SEND US A POSTAL. WE WILL CONVINCE YOU. DON'T FAIL TO GET OUR CATALOG.

THE INTERNATIONAL F. AND FIREPROOFING CO.
COLUMBUS, OHIO

How Should Concrete Stone be Made?

Have Former Methods Met the Demand for Stone of Quality?

The Questions are Serious and Pertinent

"WITH FISHER MACHINERY" answers the first question.

"WITH FISHER MACHINERY" you may forget the second question.

We state emphatically that there is no doubt as to the strength, durability and entire suitability of **True Concrete Stone** for building purposes. It has many points of superiority. Any doubt in the public mind should relate to **the method of manufacture.** Incorrect **methods** make semi-cemented blocks which are inferior, irregular and often worthless.

Quality, Scope, Capacity, Economy

and of these **quality** is the most important, yet all are embodied in the Fisher system.

Perfected Hydraulic Power Machinery

exerting 200 tons pressure. Protected by valid basic patents covering all the numerous features, without extortionate prices.

Complete operating exhibit at Convention of National Association of Cement Users, Chicago, January 7 to 12, 1907.

ASK FOR CATALOGUE N

FISHER HYDRAULIC STONE AND MACHINERY CO.

Builders' Exchange Building, Baltimore, Md.

LOCK-WOVEN STEEL FABRIC

THE UNIVERSAL REINFORCE FOR CONCRETE

Cold woven from high carbon steel.
Standard of merit in United States and Canada.
Used in Water Conduits, Storage Tanks, Drainage Canals, etc., etc.
Also the feature of our now celebrated "*Monocaste*" *Construction*, Mills, Foundries, Factories, etc. Full charge assumed of design and construction of large or small developments. Cost always within estimate. Address

W. N. WIGHT & CO.,

Designing and Contracting Architects and Engineers
160 FIFTH AVENUE, NEW YORK

A TOUCH FROM A LIVE WIRE

Are you in touch with the development of trade?

Are you receiving your share of the large orders which are being placed for

Materials, Machinery, Tools, Equipment, Contractors' Supplies, etc.?

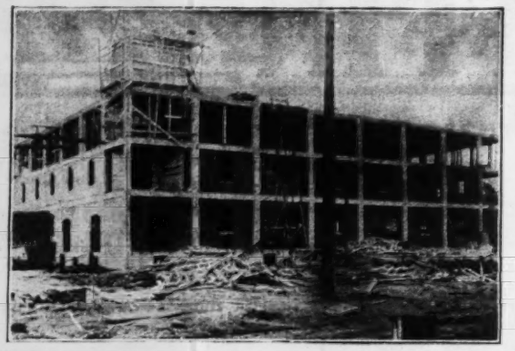
ENGINEERING NEWS is read by more Contractors, Engineers and Material Men than any other engineering paper. It is a journal ably edited, covering thoroughly the subjects of Civil, Mechanical, Mining and Electrical Engineering, thus making the circulation valuable for the *quality*.

It is the most extensively read and most frequently quoted engineering paper in America.

If you wish to sell MACHINERY, TOOLS, EQUIPMENT, CONTRACTORS' SUPPLIES, Etc., try a "FOR SALE" advertisement at $1.50 an insertion, and watch the results.

If you are in a position to ask for bids on PUBLIC WORK remember that ENGINEERING NEWS carries more Proposal advertisements than any other paper.

IF YOU ARE LOOKING FOR **QUALITY, READ ENGINEERING NEWS**



L. J. MENSCH, M. Am. Soc. C. E.

Designer and Builder of

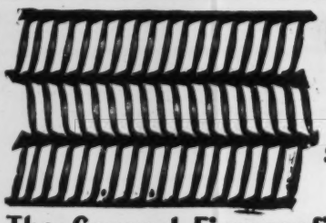
Reinforced Concrete Construction

Monon Bldg., Chicago, and Constitution Bldg., Salt Lake City

LATEST REFERENCES: Power House for Utah Copper Co., 300 x 70 ft.; Concentrator for Utah Copper Co., 600 x 400 ft.; Concentrates Bins for Utah Copper Co.. 37,000 tons cap.; Two Smoke Stacks for Utah Copper Co., 13 x 180 ft.; Office Building for Rocky Mountain Bell Telephone Co.; Office Building Utah Trust & Savings Bank; Fertilizer Building for Swift & Co., Wilmington, N. C.; Warehouses, Stables and Barns for Brown Transfer Co., St. Joseph, Mo.

ARMORED CONCRETE **"HENNEBIQUE SYSTEM"** ARMORED CONCRETE

HENNEBIQUE CONSTRUCTION CO., - - - 1123 Broadway, New York



HERRINGBONE LATH

Rigid, Self-furring, Non-buckling
Saves Labor, Perfect Key
Saves Plaster

Sold by Builders' Supply Dealers in all Principal Cities

MADE BY

The General Fireproofing Co., Youngstown, Ohio

Manufacturers Expanded Metal for All Purposes

Offices: New York, Boston, Washington, Chicago

Are You in a Hurry? I Can Help You Out!

Twisted and Plain Steel Bars for Reinforced Concrete

⅜, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼. Cut to required lengths without extra charge.

Immediate Shipment — CHARLES D. CRANDALL

Write me to-day. 223 Hickory Street, Warren, Penna.

The Circulation of **Engineering News** Among Prominent Contractors ... Probably **Exceeds** that of any other **Five Papers**

ADVERTISE YOUR WORK IN ENGINEERING NEWS.

Ferrolinclave

TRADE MARK

CORRUGATED STEEL SHEETS FOR CONCRETE ROOFS.

Can be erected in the worst winter weather and will then give the same protection as an ordinary corrugated iron roof. In the spring, the cementing of both sides may be done at your leisure. This reinforced concrete construction is exceptionally light, moderate in cost and presents a splendid appearance. Write for catalog.

THE BROWN HOISTING MACHINERY CO.

NEW YORK CLEVELAND PITTSBURGH PACIFIC SUPPLY CO., SAN FRANCISCO

KAHN SYSTEM of Reinforced Concrete

From Burned Ruins to Finished Factory in Forty Days—a record in fireproof construction made possible by the Kahn System of Reinforced Concrete.

In September last, just at the opening of the rush season, part of the plant of the Anderson Carriage Co., Detroit, was destroyed by fire, as illustrated below. On October 3d contract was let for a reinforced concrete building three stories high, 91 x 303 feet in size, and on November 3d the building was under roof, as illustrated above. **The contract called for the building ready for occupancy in forty working days.**

The Kahn System, based upon the Kahn Trussed Bar, was used throughout. The Kahn Trussed Bar, when imbedded in concrete, gives the most scientific, economical and thorough reinforcement obtainable. Buildings erected by this system are monolithic in type, impervious to fire and the ravages of time.

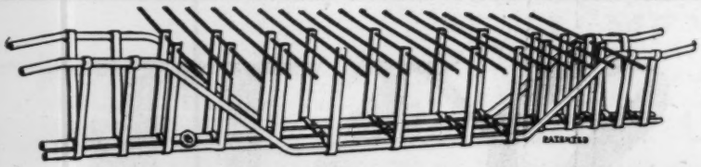
The Kahn System insures economy in design through the experience of our Engineering Department, and minimum cost of installation through the use of the Kahn Trussed Bar, which is shop-prepared, thus eliminating much expensive field labor, and making possible a speed in erection never before attained in structural work.

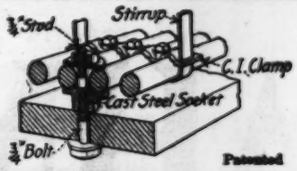
Detailed information and interesting literature sent on request. If request is written on your business letter-head, we will send you the "Trussed Concrete Bulletin" one year free of charge.

TRUSSED CONCRETE STEEL CO.

35 CONGRESS STREET

LONDON **DETROIT** TORONTO

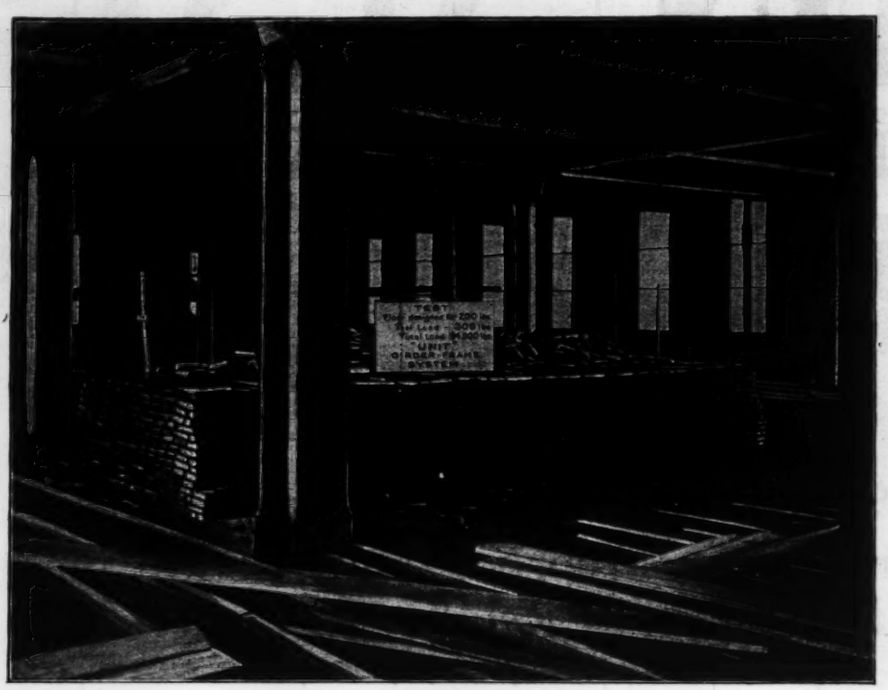




Unit Girder Frame

Designed as
Built as
Delivered as
Erected as
Acts as

A Unit



Unit Socket

For Locating Reinforcement
Securing Reinforcement
Allowing Inspection
Proper Fireproofing
Supporting Shafting

Power House Victor Talking Machine Company, Camden, N. J.

UNIT CONCRETE STEEL FRAME CO.

NEW YORK OFFICE, St. James Bldg. 1313 Commonwealth Bldg., Philadelphia, Pa. BOSTON OFFICE, 161 Devonshire St.

Interior View Main Machine Building, Traders' Paper Board Co., Bogota, N. J.

Reinforced Concrete Construction

THE CURTIN RUGGLES CO.

Design and erect industrial plants of any character.
Design, erect and equip Cement Mills of any rated capacity, turning them over to customer ready for operation.
Are Eastern Agents for the Youngstown Iron and Steel Roofing Company, Expanded Metal and Lath, Patent Studding and Furring Strips.

WRITE US FOR QUOTATIONS

THE CURTIN RUGGLES CO.

Contracting Engineers

39 CORTLANDT STREET NEW YORK

Before Building

INVESTIGATE

Reinforced Concrete Construction

Whether you are considering fireproof, non-fireproof or slow burning construction, get our bid on reinforced concrete construction. The cost of a concrete building is from 20 to 30 per cent. less than steel and only 10 or 15 per cent. more than wood.

Concrete never rusts—resists vibration—is not only fireproof but is more nearly waterproof than any other form of construction — receives the best rates from insurance companies — is the most durable building material under all conditions.

Co-operation willingly extended in preparing economical layouts, and estimates gladly given either for specified concrete buildings or as alternates, when any other form of construction is designated.

Concrete construction is by far the best for warehouses, mills, manufacturing plants, where the floor load is heavy and fireproofing necessary.

For any preliminary studies, consultation or assistance, communicate with

JOHN G. BROWN, C.E., Specialist in Reinforced Concrete
(Formerly Manager of the Unit Concrete Steel Frame Company)
634 Witherspoon Building, Philadelphia, Pa.

572-A

HIGH CARBON STEEL FOR REINFORCING CONCRETE.

PLAIN BARS ROUNDS SQUARES FLATS. 3/4. 7/8. 1 and 1 1/4 in.
TWISTED BARS. 3/8. 1/2. 5/8.

PROMPT SHIPMENTS — CUT TO REQUIRED LENGTHS

BUFFALO STEEL CO. TONAWANDA, N.Y. OR INLAND STEEL CO. CHICAGO. FIRST NATIONAL BANK BLDG.

NEW YORK REPRESENTATIVE, GEO. LEAS, No. 1 MADISON AVENUE

GABRIEL CONCRETE STEEL

1206 PENOBSCOT BUILDING, DETROIT, MICHIGAN

EFFICIENT
CONVENIENT
ECONOMICAL
VERTICAL
DIAGONAL
HORIZONTAL
REINFORCEMENT

FREDK. TURNBULL, Pres. J. R. DE GRATRESSE, C. E., M. E., Chief Engineer. WM. LAWRIE REID, Vice-Pres.

Reid-Turnbull Construction Co.

1206 PENNSYLVANIA BUILDING PHILADELPHIA, PA.

REINFORCED CONCRETE

BRIDGES, DAMS, AQUEDUCTS, RETAINING WALLS, SEWERS, AND BUILDINGS OF EVERY DESCRIPTION

MONOLITH STEEL COMPANY, INC.,

COLORADO BUILDING WASHINGTON, D. C.

Easily assembled on building site or furnished ready for placing. Adapted to any Design of Concrete Construction

Monolith Steel Bars

Web members may be of ANY LENGTH OR NUMBER

No Sharp Corners, No Reduction of Strength in Either Member.

Rolled in Sections Equivalent to

Square Bars of - - 1½-in., 1-in., 8/10-in., and ½-in.

Web Member Sections, ½-in., 3/8-in., 5/16-in., and 3/16-in.

J. F. Golding, Patentee.

STRUCTURAL CONCRETE CO.

REINFORCED CONCRETE CONSTRUCTION

REPRESENTATIVES:
CUMMINGS SYSTEM

156 FIFTH AVENUE NEW YORK CITY

THE CUMMINGS SYSTEM

Electric Welding Mfg. Co.
4 Smithfield St. Pittsburg, Pa.

Steel for Reinforced Concrete

TURNER CONSTRUCTION CO.

Engineers and Contractors for

Reinforced Concrete

11 BROADWAY, NEW YORK CITY

WORK SATISFACTORILY DONE IS THE BEST GUARANTEE

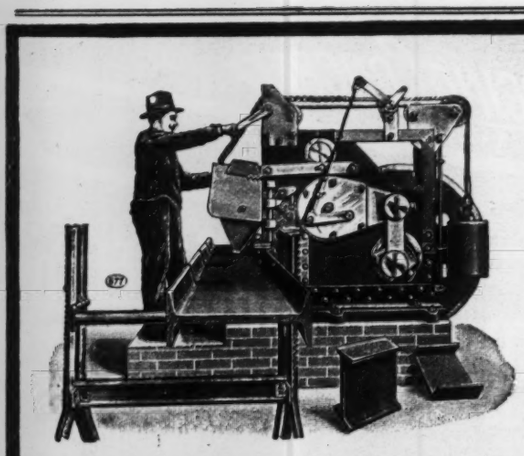
We Have Constructed

ROBERT GAIR CO., Factory,	9 stories,	100 feet x 200 feet
C. KENYON CO., Factory,	6 stories,	80 feet x 140 feet
BUSH TERMINAL CO., Factory,	7 stories,	75 feet x 600 feet
BUSH TERMINAL CO., Warehouse,	8 stories,	150 feet x 300 feet
G. SCHIRMER, Factory,	6 stories,	50 feet x 90 feet
KEUFFEL & ESSER CO., Factory,	5 stories,	50 feet x 300 feet
KEUFFEL & ESSER CO., Factory,	6 stories,	60 feet x 225 feet
EASTERN STATES REFRIGERATING CO., Warehouse	5 stories,	50 feet x 140 feet
J. B. KING & CO., Buildings, Staten Island,		

AND MANY OTHERS.

We are prepared to figure on buildings requiring a large organization and plant

Twisted Steel Bars carried in stock for prompt sale



Rapid Cutting of Structural Shapes

done most economically with

JOHNS PATENT

Beam Shears

Built of Steel Plates
Hundreds in Daily Use

Write for Catalog N4 and Samples

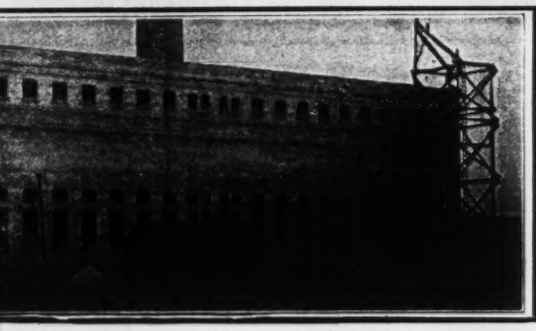
Henry Pels & Co. 60 Broad St. New York

Steel Storage and Elevator Construction Company
BUFFALO, N. Y.

BUILDERS OF **STEEL GRAIN ELEVATORS**
Write for Catalogue

Pittsburg Razing and Erecting Co.

Bridges, Mill and Storey Buildings
Coal Tipples Ore Conveyor.
Blast Furnaces and Plate Work
ESTIMATES FURNISHED
Fulton Building Pittsburg, Pa.



The Baltimore-Ferro Concrete Co.

Engineers and Contractors

Glenn Building *Baltimore, Md.*

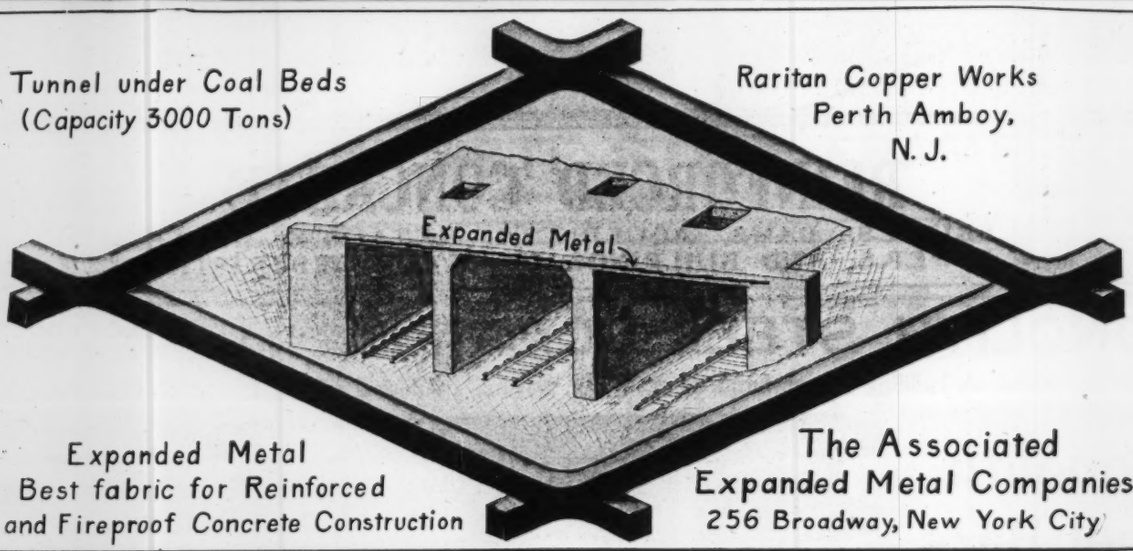
with a record of over one hundred structures of every type and an organization of five years' standing, we have set a standard for high-class reinforced concrete work. Our expert staff of engineers and long experience are at your service. Speed, consistent with perfect workmanship, our specialty.

Write for information.

WESTPORT POWER HOUSE.
255 x 110 x 75 feet high. Ready for machinery four months after starting Concrete throughout, walls, floors, columns, girders, coal and ash pockets, etc.

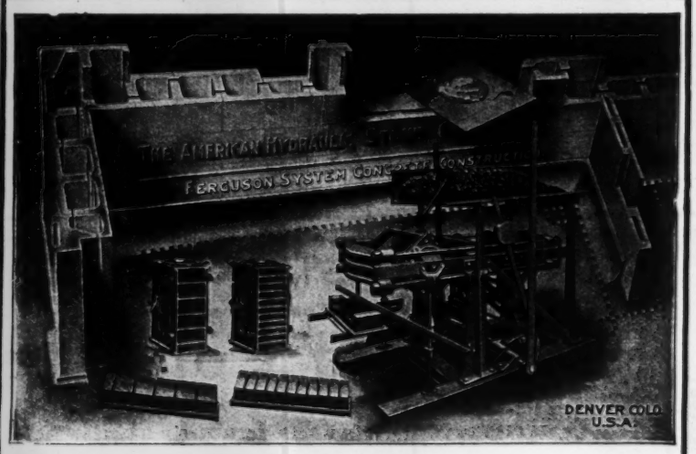
Tunnel under Coal Beds
(Capacity 3000 Tons)

Raritan Copper Works
Perth Amboy,
N. J.



Expanded Metal
Best fabric for Reinforced
and Fireproof Concrete Construction

The Associated
Expanded Metal Companies
256 Broadway, New York City



Two-piece Hollow Concrete Wall and Partition, containing Header Bond and Continuous Horizontal Air Space. Impervious to Heat, Cold, Moisture and Sound. Fire and Vermin Proof. Walls of all widths; blocks of all shapes and sizes. New Hand Press enables three men (mixture supplied) to make 1,200 blocks, 10,000 bricks or 5,000 paving blocks in ten hours. **The walls of a cottage are the work of a single day.** 80-page Catalog, fully illustrated, mailed upon request.

THE AMERICAN HYDRAULIC STONE CO.
Century Building, Denver, Colo.

W. N. KRATZER & CO., 3212-3230 Smallman Street
Structural Steel and Ornamental Iron Work PITTSBURG

"MARINE TOCKOLITH"
(TRADE MARK REGISTERED)

A CEMENT PAINT

PATENTED

The Problem of Permanent Protection of Structural Steel and Iron solved at last by use of "MARINE TOCKOLITH"

For particulars, write to

TOCH BROTHERS

Paint Makers Since 1848 NEW YORK
Telephone, 5390 Madison Square 320 Fifth Avenue
Works: Long Island City, L. I.

REINFORCED CONCRETE TANKS

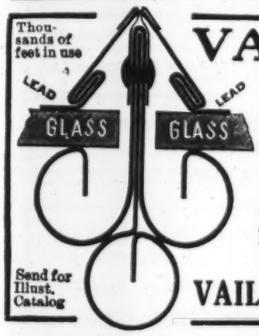
Simpson Bros. Corporation
ENGINEERS and CONTRACTORS
166 Devonshire Street, Room 58
BOSTON, MASS.

Ludowici-Celadon Company
Terra Cotta Roofing Tiles
Superior and Economical for Power Houses and Factories
PROMPT SERVICE FROM FOUR PLANTS
GENERAL SALES OFFICE, CHICAGO

STEEL BUILDINGS & BRIDGES
STEEL TANKS & CAISSONS RIVETED STEEL PIPE
Wm. B. Scaife & Sons Co., Pittsburgh, Pa.

Concreted on Top. Plastered Underneath.

FERRO-LITHIC STRAIGHT SHEETS
A simple solution of the "EVERLASTING ROOF" QUESTION
A reinforced concrete roof made without centering. Send for description.
THE BERGER MFG. CO.
CANTON, OHIO.



VAILE & YOUNG'S
PATENT METALLIC
SKYLIGHTS
WITHOUT PUTTY
Perfect Construction for RAILROAD BUILDINGS, FACTORIES, etc., where LARGE and CONTINUOUS LIGHTS are required.
VAILE & YOUNG, Baltimore, Md.

BOSTON BRIDGE WORKS
C. H. ANDREWS, Pres. INCORPORATED
ENGINEERS AND CONTRACTORS
Steel Bridges, Buildings Roofs, Turntables, Etc.
47 WINTER ST., BOSTON, MASS.

PATTERSON BLOCKS ARE THE BEST
All Sheaves Bushed. All Hooks made from Staybolt Iron and Flattened. Also Extra Heavy Oil Well Blocks
WRITE FOR PRICES
W.W. Patterson Co.
54 Water Street, Pittsburg

Portable Hollow Concrete Block Machine
Best, Fastest Simplest, Cheapest
No carrying off blocks
No loss by breakage or crackage
No heavy, expensive iron pallets
No cogs, gears, springs or levers
Every block perfect
Sent on trial
Guaranteed to give satisfaction
THE PETTYJOHN CO.
627 N. 6th Street Terre Haute, Ind.

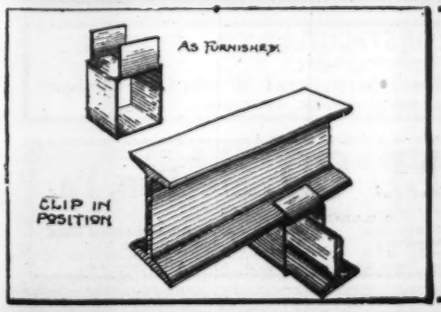
MORAVA CONSTRUCTION CO.,
MANUFACTURERS
STRUCTURAL STEEL
See larger ad. first issue each month. CHICAGO, ILL.

THE MOUNT VERNON BRIDGE CO.
ENGINEERS AND MANUFACTURERS OF
Iron and Steel Mill Buildings and Structural Work
Railway and Highway Bridges, Roofs, Viaducts, etc.
WORKS, MOUNT VERNON, O. COLUMBUS OFFICE, 610 WYANDOTTE BUILDING

The BUCKEYE TROUGH FLOOR is the Best for BRIDGES, ROADWAYS OR SIDEWALKS. Is also adapted for FLOORS OF HEAVY WAREHOUSES, MACHINE-SHOPS, FIRE STATIONS, SIDEWALK AREAS, FIREPROOF BUILDINGS AND VAULTS.
See ENGINEERING NEWS July 9, 1896, p. 18, for Description.
The Youngstown Iron & Steel Roofing Co.
Youngstown, Ohio.

NO EXTRA CHARGE
CLASSIFIED ADVERTISEMENTS for Engineering News may be left at any American District Messenger Office in New York City until 9 p. m. every day.
Classified Advertisements in Engineering News bring results.

UNDERWRITERS' ENGINEERING & CONSTRUCTION CO.
Engineers and Contractors
in Reinforced Concrete Construction
Contracts solicited only on the basis of cost-plus-a-fixed-sum
1170 Broadway New York



H. A. STREETER'S PATENT Steel Clip
Saves half expense in connecting Tees, Angles, or other iron or steel shapes to I-Beams or Channels in structural or ornamental steel work buildings. Does away with Punching, Drilling or Bolts. Extensively used by Carnegie Steel Co., Jones & Laughlin, and other notable firms.
H. A. STREETER
Patentee
31-33 Indiana Street, Chicago, Ill.

BELMONT IRON WORKS
MAIN OFFICES AND SHOP, PHILADELPHIA. BRIDGE SHOP, EDDYSTONE, PA. NEW YORK OFFICE, 21 PARK ROW
STEEL BRIDGES AND BUILDINGS
STOCK BEAMS AND SHAPES, BRIDGE RAILINGS, ORNAMENTAL IRONWORK

THE INTERSTATE ENGINEERING CO.
CLEVELAND, OHIO
KALTENBACH & GRIESS, ENGINEERS
Steel Buildings and Bridges for Construction.

KING BRIDGE COMPANY

Office and Works: CLEVELAND, O.

Bridges, Structural Work, Turntables, etc.

New York Office: 277 BROADWAY

OFFICES
Pittsburgh, Pa., Park Bldg.
New York, 21 Park Row
Chicago, 1st National Bank Bldg.
St. Louis, Missouri Trust Bldg.
Pottstown, Pa.
Carnegie, Pa.

McCLINTIC-MARSHALL CONSTRUCTION COMPANY

CAPACITY, 150,000 TONS PER ANNUM

STEEL BRIDGES, BUILDINGS, ETC.

WORKS
Pittsburgh, Pa.
Pottstown, Pa.
Carnegie, Pa.

LEWIS F. SHOEMAKER & CO.

SCHUYLKILL BRIDGE WORKS — STEEL BRIDGES AND BUILDINGS

Works; Pottstown, Pa. General Offices: Harrison Building, Philadelphia New York Office: 45 Broadway

---

THE COWING LIFT BRIDGE

MOST MODERN TYPE OF BRIDGE

The Jefferson Street Bridge Cleveland, Ohio.

Highest Award at St. Louis, Mo., 1904 *Plans and Estimates promptly furnished*

THE COWING ENGINEERING COMPANY

Builders of Bridges, Buildings and Structural Steel Work 426 Citizens Building, Cleveland, Ohio

New Jersey Bridge Company, Eastern Agents, 1901 Fuller Building, New York City.
International Contract Co., Western Agents, 737 New York Block, Seattle, Wash.

STRAUSS

BASCULE BRIDGES

GUARANTEED Estimates of Cost on Application

WALLACE-COATES ENGINEERING CO.

SOLE AGENTS AND CONSTRUCTORS

Main Office, 355 Dearborn St., Chicago Western Office, 558 Sherlock Bldg., Portland, Ore.

Write or call us up. Telephone, Harr. 3404

STRAUSS BASCULE AND CONCRETE BRIDGE CO. ENGINEERS AND DESIGNERS CHICAGO

Bellefontaine Bridge & Iron Co.

BELLEFONTAINE, OHIO

All kinds of BRIDGES and STRUCTURAL WORK

BOOKS

On any subject in which you are interested will be sent by us charges prepaid UPON RECEIPT OF PRICE. All orders are given prompt attention.

THE ENGINEERING NEWS PUBLISHING COMPANY, NEW YORK

Berlin Construction Company

STEEL BUILDINGS
BRIDGES
STRUCTURAL WORK

Offices and Works, BERLIN, CONN.

220 Broadway, New York

131 State Street, Boston, Mass. 22 Clinton Street, Newark, N. J.

Send for Illustrated Catalogue

KENWOOD BRIDGE CO.

E. W. PARKER, President
PAUL WILLIS, Secretary

ENGINEERS & BUILDERS OF STRUCTURAL STEEL WORK

OFFICE, 1216 FIRST NATIONAL BANK BUILDING, CHICAGO

Works, Grand Crossing, Ill. Telephone, "Central 3776"

PENN BRIDGE CO.

Contractors and Manufacturers

Bridges, Buildings and Steel Structural Work

Established 1868 Capacity 10,000 tons a year. BEAVER FALLS, PA.

BRIDGES, BUILDINGS AND STRUCTURAL STEEL

DESIGNED, MANUFACTURED AND ERECTED

BARTLETT STEEL COMPANY

JOPLIN, MO.

OVER 3,000 TONS IN STOCK WRITE FOR PRICES

Missouri Valley Bridge and Iron Co.

LEAVENWORTH, KANSAS

Engineers and Contractors

For Bridges, both Substructures and Superstructures, Steel Buildings, Fireproof Wharves, Pneumatic and Open Foundations

---

ATTICA BRIDGE CO.

MANUFACTURERS OF STEEL STRUCTURES
WE GUARANTEE OUR WORKMANSHIP

ATTICA IND.

SCHERZER ROLLING LIFT BRIDGES

Fulfill Every Modern Requirement of a Movable Bridge, and are Replacing Swing Bridges in this Country and Abroad. Write us for Information, Sketches and Estimates.

THE SCHERZER ROLLING LIFT BRIDGE CO.

Cable Address: Scherzer, Chicago Main Offices, 1616 Monadnock Block, Chicago, U. S. A.

WISCONSIN BRIDGE & IRON CO.

MILWAUKEE, WIS.

MINING AND MILL BUILDINGS——BRIDGES——STRUCTURAL WORK

STROBEL STEEL CONSTRUCTION CO.

Successors to C. L. STROBEL

Contracting Engineers

Bridges, Turntables, Steel Structural Work, Lift Bridges

1744 MONADNOCK BLOCK, CHICAGO

BRIDGES, VIADUCTS, BUILDINGS.

THE PENNSYLVANIA STEEL CO. Steelton, Pa.

All Structures of Steel and Iron

BRANCH OFFICES:
PHILADELPHIA, Girard Bldg.
NEW YORK, 71 Broadway
BOSTON, 70 Kilby St.
CHICAGO, Western Union Bldg.
BALTIMORE, Continental Trust Bldg.
ST. LOUIS, Security Bldg.
SAN FRANCISCO, 508 Market St.
LONDON, ENG., 110 Cannon St.

FORT PITT BRIDGE WORKS
OF PITTSBURG, PA.

We Make a Specialty of Quick Delivery. **Structural Steel** For Bridges, Buildings, etc.

Main Office and Works, CANONSBURG, Pa.
PITTSBURG, 510 HOUSE BUILDING
NEW YORK, 45 BROADWAY

THE VARIETY IRON WORKS CO.
CLEVELAND, OHIO
Bridges Buildings Boilers

THE TOLEDO-MASSILLON BRIDGE CO.
Steel Bridges and Buildings
Successors to THE MASSILLON-BRIDGE CO. TOLEDO, OHIO

CENTRAL STATES BRIDGE COMPANY
Railway and Highway Bridges, both Steel and Concrete
Structural Steel and Iron Work
Plans and Estimates Furnished INDIANAPOLIS, INDIANA

THE PHOENIX BRIDGE COMPANY
OFFICES:

410 Walnut St., Philadelphia	Phoenixville, Pa.	49 William St
455 Rookery, Chicago	110 State St., Boston	New York

ENGINEERS AND BUILDERS OF
Bridges, Viaducts, Roofs, Turntables
ELEVATED RAILROADS, OCEAN PIERS
And All Structures of Iron and Steel
All Work Done on the Premises—from Ore to Finished Bridge
Capacity of Bridge Works 40,000 tons per annum

DAVID REEVES, President
W. H. REEVES, General Superintendent — SEYMOUR P. THOMAS, Resident Engineer, New York
FRANK T. DAVIS, Treasurer — OSCAR J. WEST, Resident Engineer, Chicago
JOHN STERLING DEANS, Chief Engineer — H. O. RUSS, Resident Engineer, Boston
Estimates and Special Designs will be Furnished on Application

TURNTABLES
Bridges—Buildings—Structural Steel
VIRGINIA BRIDGE & IRON COMPANY
ROANOKE, VIRGINIA

CHAMPION BRIDGE CO.
WILMINGTON, OHIO
Manufacturers of Bridges & Structural Work

THE L. SCHREIBER & SONS COMPANY
CINCINNATI, OHIO
Structural and Ornamental Iron Work

1170 Broadway, New York — 1512 Machesney Building, Pittsburgh
THE JOBSON-HOOKER CO.
CONTRACTORS FOR
Intricate and Heavy
Structural Erection
Bridges and Buildings
ESTIMATES FURNISHED ON WORK REGARDLESS OF LOCATION

YORK BRIDGE CO.
YORK, PA.
STRUCTURAL WORK, BRIDGES

Please mention ENGINEERING NEWS.

New England Structural Co.
ENGINEERS AND CONTRACTORS
STEEL BUILDINGS AND BRIDGES
110 State St., BOSTON Works: EAST EVERETT, MASS.

STANDARD BRIDGE CO.
Engineers and Contractors OMAHA, NEB.

J. McMULLEN, President — E. SCHRADER, Secretary
San Francisco Bridge Company
ENGINEERS AND CONTRACTORS
Dredging, Dredging Machines, Land Reclamation, Docks, Piers, Foundations, Bridges. 220 Market St., San Francisco

MILWAUKEE BRIDGE COMPANY

STUPP BROS. BRIDGE AND IRON CO.
ST. LOUIS Missouri
Manufacturers and Contractors Bridges and Structural Work

The Eastern Construction Company
McKEE & BEERS, PROPRIETORS
48 to 62 Classon Ave., Brooklyn, N. Y.
Contractors and Erectors Bridges, Buildings and Steel Structures

Riverside Bridge Co.
WHEELING, W. VA.
Bridges, Viaducts and Heavy Structural Steel
Modern Equipment *Annual Capacity, 15,000 Tons*

NICKEL
FOR NICKEL STEEL
Write us for information
THE ORFORD COPPER COMPANY
NICKEL REFINERS
43 EXCHANGE PLACE, NEW YORK

PASSAIC STEEL COMPANY
Bridges and Buildings
OPEN-HEARTH STEEL SHAPES
General Offices and Works, Paterson, N. J.
Telephone, 2098 Cortlandt — New York Office, 170 Broadway

STRUCTURAL STEEL

For Bridges, Buildings
Roof Trusses, etc.

The Locomotive and Machine Company

OF MONTREAL, LIMITED

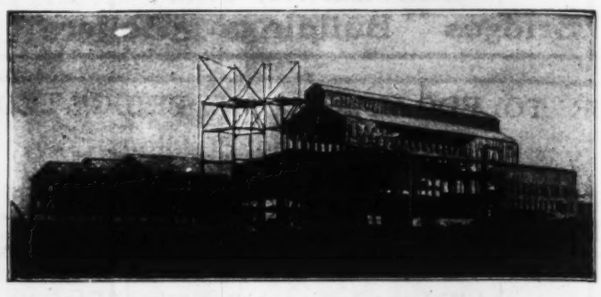
Imperial Bank Building, Montreal

MINOR C. KEITH, President H. D. BUSH, Vice-Pres. and Mg

Baltimore Bridge Company

GENERAL OFFICE AND WORKS: Bush St. and B. & O. R.R., Baltimore, M

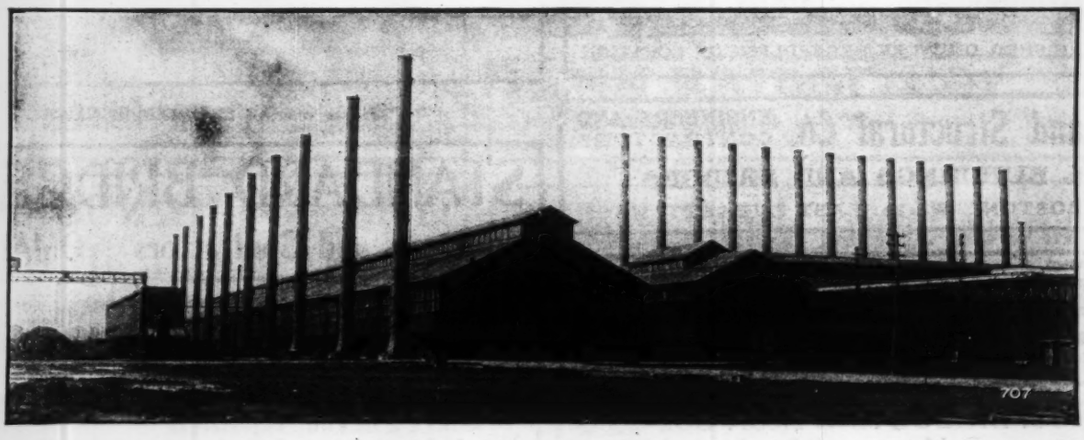
NEW YORK OFFICE: 66-68 Broad Street



LARGEST SUGAR MILL IN THE WORLD

Erected at Nipe Bay, Cuba, 1906. Our contract covered steel buildings, complete, ready for machinery; also steel molasses tanks 400,000 gallons capacity. Steelwork fabricated in our own shops. Erection done with our own plant and men.

STEEL BRIDGES
AND
BUILDINGS
AND
STRUCTURAL WORK GENERALLY



MILL OF THE NATIONAL TUBE CO., LORAIN, OHIO.

American Bridge Company of New York

Structural Steel for Every Purpose || **Annual Capacity 700,000 Tons**

General Offices: 42 Broadway, New York

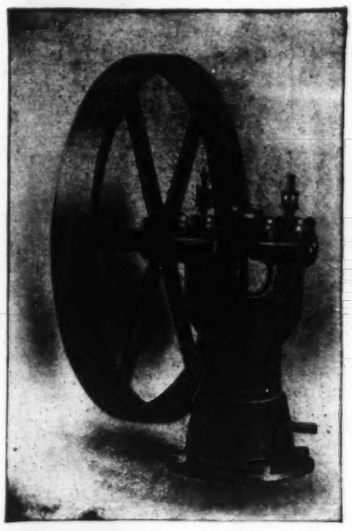
Westinghouse

Steam-Driven, Motor-Driven and Belt-Driven

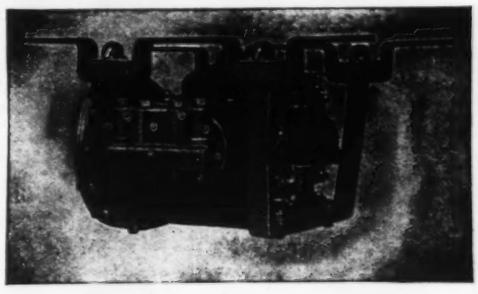
Air Compressors

Particularly adapted to supplying air for pneumatic tools, sand blast, paint spraying, etc., in the erection of steel buildings, and for contractors on railway and bridge work.

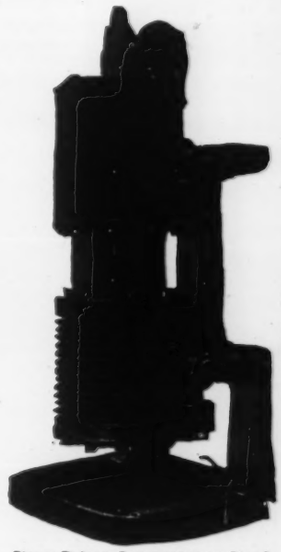
Capacities range from 15 to 130 cu. ft. of free air per minute.



Single-Cylinder, Belt-Driven Compressor.



Manner of Suspending Motor-Driven Compressor.



Steam-Driven Compressor on Stand.

The Westinghouse Air Brake Co.

General Offices, Pittsburg, Pa.

Address nearest office for information

Boston, 638 Exchange Bldg.
Buffalo, 774 Ellicott Square Bldg.
Chicago, 1545 Railway Exchange Bldg.
Cincinnati, 1111 Traction Bldg.
Cleveland, 1007 New England Bldg.
Columbus, 1132 Columbus Sav. & Trust Bldg.
Denver, 604 Majestic Bldg.
Los Angeles, 527 South Main St.
Mexico City, Mex., 4½ Calle de San Diego.
New York, 2014 Trinity Bldg.
Richmond, 804 American Nat'l Bank Bldg.
St. Louis, 1932 North Broadway.
St. Paul, 634 Endicott Bldg.
San Francisco, 13th and Broadway, Oakland, Cal.

For Canada: Canadian Westinghouse Co., Ltd., Hamilton, Ontario.

Westinghouse

Westinghouse Type-S Generator. Direct Coupled to American Blower Co. Engine.

Small Direct Current Generating Sets

High Operating Economy—Low Maintenance and Attendance

Strong, compact construction. Designed to meet the severest conditions. Built in capacities from 4 K.W. to 50 K.W.

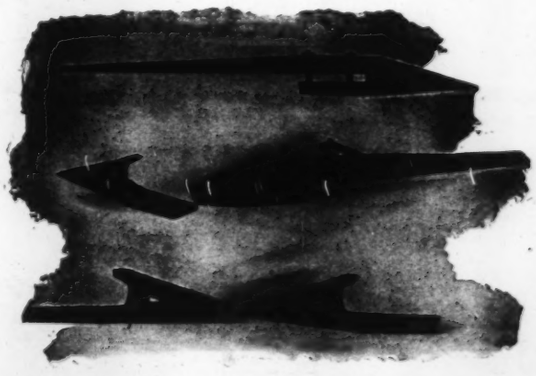
Address nearest District Office for information

Westinghouse Electric & Mfg. Co.

Westinghouse Type-S Generator, Direct Coupled to American Blower Co. Engine.

Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Los Angeles, Minneapolis, New Orleans, New York, Philadelphia, Pittsburg, St. Louis, Salt Lake City, San Francisco, Seattle, Syracuse

Canada: Canadian Westinghouse Co., Ltd., Hamilton, Ontario. Mexico: G. & O. Braniff & Co., City of Mexico.



CONTRACTORS WHO USE

"Taylor-Made" Crusher Parts and Panama Teeth

seldom have to stop work on the field for repairs—and when they do, the fault is almost always somewhere else than in our castings. Our wearing parts WEAR—that's what you want—that's what you pay for, and that's what you get if you specify

"TAYLOR-MADE" MANGANESE STEEL

TAYLOR IRON & STEEL COMPANY, High Bridge, N. J.

"OLD DOMINION" Portland Cements
"PHOENIX"
Portland Cements "BUCKHORN"
WM. G. HARTRANFT CEMENT CO., Sole Selling Agent
WORKS { FORDWICK, VA. NAZARETH, PA. MANHEIM, W. VA.
Real Estate Trust Building PHILADELPHIA, PA.

TRAYLOR ENGINEERING CO.
Offices, 114 Liberty Street, New York Works, Allentown, Pa.
Cement Making Machinery
ROCK CRUSHERS { "Blake" Crushers / Crushing Rolls } In Stock Ready for Delivery
DIFFER FROM OTHERS Complete Plants Designed and Built
The differences are what make them better Catalogues Free

THE STANDARD AMERICAN BRAND
Atlas Portland Cement
ALWAYS UNIFORM
The Atlas Portland Cement Co., 30 Broad Street, New York

Preserve Wood
AGAINST ROT AND DECAY. USE
Avenarius Carbolineum
Registered
ON THE MARKET SINCE 1873
CARBOLINEUM WOOD PRESERVING CO.
349 West Broadway, New York
126 Reed Street, Milwaukee, Wis.
160 Front Street, Portland, Ore.

TRENCH MACHINES
We Sell and Lease All Kinds of Hoisting and Conveying Machines for Trench Work
Catalogue Sent Upon Request
Carson Trench Machine Co.
BOSTON, U. S. A.
BRANCH OFFICES: 10 Barclay Street, New York; Park Bldg., Cleveland, 309 St. James Street, Montreal

DRAGON PORTLAND CEMENT
USED 17 YEARS
By Iron and Steel Companies
And on 35 Railroad Systems
ELSEWHERE IN 1000 PLACES IN U. S.
The Lawrence Cement Company
Sales Offices { New York, No. 1 Broadway / Philadelphia, Harrison Building
NEW CEMENT TESTING FREE

WM. H. BRISTOL
Electric Pyrometers
Portable and Switchboard Forms
All ranges to 2,900° F.
Practical, Accurate, Inexpensive
Send for Circulars
WM. H. BRISTOL
45 Vesey St. N. Y.

ABSOLUTELY ACCURATE TACHOMETERS
HAND TACHOMETERS
for portable use in measuring the shaft speed of all classes of machinery; very sensitive and accurate; speed ranges from 30 r. p. m. to 4,000 r. p. m., and from 200 r. p. m. to 24,000 r. p. m. Tachometers for all purposes.
Magara Tachometer and Instrument Co.
Niagara Falls, N. Y., U. S. A.

Quick or Slow Set; but Quick Cement is less durable.
The oldest and strongest makers of high-grade cement in the world.
ALSEN
The Panama Canal Cement. Write for list of other important works. The safest and best colored cement for sidewalks and blocks.

GRAVITY AND PRESSURE FILTERS
For Municipal, Industrial, Textile and Railroad Use
GENERAL CONTRACTORS
THE NEW YORK CONTINENTAL JEWELL FILTRATION CO.
167 Dearborn Street, Chicago 15 Broad Street, New York

"FEDERAL" FILTER
(TRADE MARK)
Constructed for Water Works
Water Softening Plants
And All Water Filtration Purposes
Twenty Years' Experience
FEDERAL FILTRATION SYSTEM
WM. M. DEUTSCH, Patentee
141 BROADWAY NEW YORK

THE OLD RELIABLE GIANT PORTLAND CEMENT
has always been WHAT the engineer wanted. Owing to the doubling of our capacity it can now be had WHEN the contractor wants it.
AMERICAN CEMENT COMPANY, Manufacturers.
LESLEY & TRINKLE CO., General Sales Agents, 15th & Chestnut Sts., Philadelphia.
UNITED BUILDING MATERIAL COMPANY,
320 Broadway, New York. 101 Milk Street, Boston, Mass.

THE STANDARD OF HIGH QUALITY
Send for Circular No. 39
MARQUETTE PORTLAND CEMENT
MARQUETTE CEMENT MANUFACTURING CO.
1513-1514 Marquette Building, Chicago, Ill.

McAvoy Vitrified Brick Co.
Standard Vitrified Brick and Block
PERKIOMEN JUNCTION, PENNA.
1845 ARCH STREET, PHILADELPHIA

Bristol's Recording Instruments For All Industrial Work
Compel Efficient Operation
Write for Catalog N, Stating Conditions
THE BRISTOL COMPANY
Waterbury, Conn., U. S. A.
New York, 114 Liberty Street
753 Monadnock Block, Chicago
London, 23 College Hill

Quality "PENNSYLVANIA" Quality
Quality PORTLAND Quality
PENNSYLVANIA CEMENT COMPANY, 26 Cortlandt Street, NEW YORK

NAZARETH and SAYLOR'S
Portland Cement
FREDENBURG & LOUNSBURY
NEW YORK

UNIVERSAL PORTLAND CEMENT
A STANDARD PORTLAND FOR UNIVERSAL USE
Present Daily Output, 6,500 Barrels. Increasing to 17,000 Barrels
Plants at Chicago and Pittsburg
UNIVERSAL PORTLAND CEMENT CO.
Successor to CEMENT DEPT. ILLINOIS STEEL CO.
THE ROOKERY—CHICAGO

BEACH'S BROOKLYN BRIDGE HOFFMAN NEWARK-ROSENDALE NORTON XXX
ROSENDALE
DOES NOT CONTAIN DETRIMENTAL PROPERTIES
NEVER DISINTEGRATES
CEMENT
CONSOLIDATED ROSENDALE CEMENT COMPANY, 26 CORTLANDT STREET, NEW YORK

TRADE-MARK
VULCANITE PORTLAND CEMENT
REGISTERED U. S. PATENT OFFICE
REPUTATION UNRIVALLED
ONE BRAND ONLY
Sound, Strong, Uniform
One of the Oldest and THE Best
VULCANITE PORTLAND CEMENT CO.
FLATIRON BUILDING, NEW YORK
LAND TITLE BUILDING, PHILADELPHIA

LEHIGH PORTLAND CEMENT
LEHIGH
PORTLAND
CEMENT
ROSENDALE HYDRAULIC CEMENT
HIRAM SNYDER & CO., 229 Broadway, New York